EVALUATING THE POTENTIAL FOR THE DEVELOPMENT OF ILLEGAL TRADE IN FISSILE MATERIAL FROM THE FORMER SOVIET UNION: AN APPLICATION OF ULLMAN'S TRIAD

by

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Master's Thesis

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Abstract

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Chairperson of the Supervisory Committee: Professor Kurt Engelmann

The purpose of this thesis is to evaluate the likelihood that illegal trade in fissile material from the Former Soviet Union (FSU) could occur between the nuclear successor states of the FSU and bona fide customers - states/groups which may, now or in the future, wish to threaten U.S. national security interests at home or abroad with an Improvised Nuclear Device (IND).

My work will illustrate this potentiality by applying the factors of trade presented by Ullman's Triad, to show that a substance as potentially dangerous as Highly Enriched Uranium (HEU) U-235/U-238 or plutonium Pu-239 can, given the right circumstances, undergo a process of commodification and be traded illegally on the black market. I will also provide evidence to show that this process is underway and that a black market in FSU fissile material is currently developing in three phases which could result in the transfer of an adequate amount of fissile material from the FSU into the hands of terrorists who would then be able to create an Improvised Nuclear Device (IND).

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LIST OF ABBREVIATIONS

BND	GEHEIME VOM BUNDESNACHRICHTENDIENST (GERMAN VERSION OF SECRET SERVICE
BKA	BUNDESKRIMINALAMT (GERMAN VERSION OF FBI)
BW	BIOLOGICAL WARFARE
CFE	CONVENTIONAL FORCES IN EUROPE
CIS	COMMONWEALTH OF INDEPENDENT STATES
CTBT	COMPREHENSIVE TEST BAN TREATY
CW	CHEMICAL WARFARE
DOE	DEPARTMENT OF ENERGY
FEMA	FEDERAL EMERGENCY MANAGEMENT AGENCY
FBI	FEDERAL BUREAU OF INVESTIGATION
FSB	COMMITTEE FOR STATE SECURITY (FORMER RUSSIAN KGB)
FSU.	FORMER SOVIET UNION
HEU.	HIGHLY ENRICHED URANIUM
HHS-PHS	DEPT. OF HEALTH AND HUMAN SERVICES-PUBLIC HEALTH SERVICES
IAEA	INTERNATIONAL ATOMIC ENERGY AGENCY
ICO	INTERNATIONAL CRIMINAL ORGANIZATION
IND.	IMPROVISED NUCLEAR DEVICE
INF.	INTERMEDIAT RANGE NUCLEAR FORCES
MINATOM	MINISTRY OF ATOMIC ENERGY (RUSSIA)

MIRV	MULTIPLE INDEPENDENTLY TARGETED RE-ENTRY VEHICLE
MMST	METROPOLITAN MEDICAL STRIKE TEAM
MVD	MINISTRY OF INTERNAL AFFAIRS (RUSSIA)
NATO	NORTH ATLANTIC TREATY ORGANIZATION
NEST	NUCLEAR EMERGENCY SEARCH TEAM
NDU	NATIONAL DEFENSE UNIVERSITY
NPT	(NUCLEAR) NON-PROLIFERATION TREATY
PNNL	PACIFIC NORTHWEST NATIONAL LABORATORY
RFE	RUSSIAN FAR EAST
SADM	SMALL ATOMIC DEMOLITION MUNITION
SALT	STRATEGIC ARMS LIMITATION TALKS
SNF	STRATEGIC NUCLEAR FORCES
TEL	TRANSPORTER ERECTOR-LAUNCHER
UN	UNITED NATIONS
WMD	WEAPON OF MASS DESTRUCTION

ACKNOWLEDGMENTS

I would like to start by thanking the members of my thesis committee, Professor Kurt Engelmann, Professor Jess Browning and Professor Chris Jones, for all their support and counsel during this project. Additional thanks are due to Professor Kurt Engelmann, who, as the chairman of my committee, reviewed countless drafts of this thesis, but most importantly, introduced me to Ullman's Triad, the framework that provided a home to three and a half years of research into fissile material trade from the former Soviet Union. I would also like to give a very special and heartfelt thanks to the many friends I met in Russia, Kazakstan and Uzbekistan, all of whom gave freely of their time and invited me into their homes to introduce and educate me about the wonders of their countries. I would also like to thank Dr. James L. Fuller, Dr. William C. Cliff and all the wonderful people at the Pacific Northwest National Laboratory for all their support and encouragement as well as Ambassador Thomas Graham, Special Agent Barry Tobin, FBI, Special Agent James Gorman, U.S. Customs and Special Agent Johannes Funke, BKA for speaking frankly with me on this topic and answering all of my questions. And finally, I especially wish to thank my wife Franzi and my daughter Monika for enduring my numerous deployments and visits into the FSU and all their tireless support, understanding and encouragement during this process.

DEDICATION

I wish to dedicate this thesis in the hope that the people of the former Soviet Union and the people of the West can set aside the feelings of distrust bred from the Cold War and instead rekindle that victorious spirit of comradeship that will allow us to once again join forces against a common enemy which threatens the safety and security of us all.

INTRODUCTION

Since the end of the Second World War there has been an increasing demand for nuclear weapons[1]. This demand grew from the fact that the United States enjoyed a special status as the sole country to possess the "ultimate weapon" and the accompaning prestige and power that went along with it. One of our original military allies during the war became the next to express a demand for nuclear weapons and before long, the Soviet Union detonated their first nuclear device on August 29th, 1949.

The demand for nuclear weapons did not end there. Soon other states began to recognize the deterrent strength that nuclear weapons could provide. Increasing political tensions between Russia and China, which share an extensive border, was only one of many reasons that led China to test it's first nuclear weapon in 1963. And eventually both France and England also came to posses a nuclear deterrent. The spread of nuclear weapons was checked for a time by the Cold War standoff between the U.S. and the Soviet Union limiting the number to only 5 overt nuclear weapons states.[2] However, South Africa, fearing intervention on the continent by communist forces, and Israel, seeking a deterrent to years of conventional war with the Arab states, worked together

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[1] Graham T. Allison, Owen R. Cote, Jr., Richard A. Falkenrath and Steven E. Miller, Avoiding Nuclear Anarchy: Containing the Threat of Loose Russian Nuclear Weapons and Fissile Material, CSIA Studies in International Security No 12, (Cambridge, Massachusetts, The MIT Press 1996),13.

[2] According to Ambassador Robert Gallucci, one of the principal architects behind the UN Iraq weapons inspection program "thirty years ago we thought by the end of the century we'd be up to around 100[nuclear capable countries] But proliferation was held in check by the Cold War standoff between the U.S. and Soviet Union". Jack Kelly, "Arms expert warns U.S. cities face nuclear terrorism threat", Post-Gazette, 23 January 1999 www.post-gazette.com/headlines/19990123gallucci3.asp.

despite the Cold War to develop nuclear weapons but never came out as overt nuclear states.[3]

Countries with long-standing hatreds, such as India and Pakistan, did not allow the Cold War conflict between east and west to halt their research into the nuclear option, arguably to protect themselves from the other's perceived hegemonic ambitions, and blasted their way into the "nuclear club" in 1998 as the first post-Cold War nuclear powers, accompanied by much shock and surprise from the West. And the fact that North Korea, Iran and Iraq are all, as of this writing, continuing their efforts to develop a sustainable industrial infrastructure that will result in an independent nuclear weapons capability is well known and documented.

The current status of nuclear proliferation in today's post Cold War world can be seen in the following figure which identifies the overt nuclear states (states which have or are in the process of openly integrating nuclear weapons into their arsenals), those that remain undeclared, and those that are still actively pursuing the nuclear option.

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[3] Ambassador Thomas Graham, Jr., President of the Lawyers Alliance For World Security (LAWS), interviewed by author, 21 January, 1999, tape recording University of Washington, Seattle.

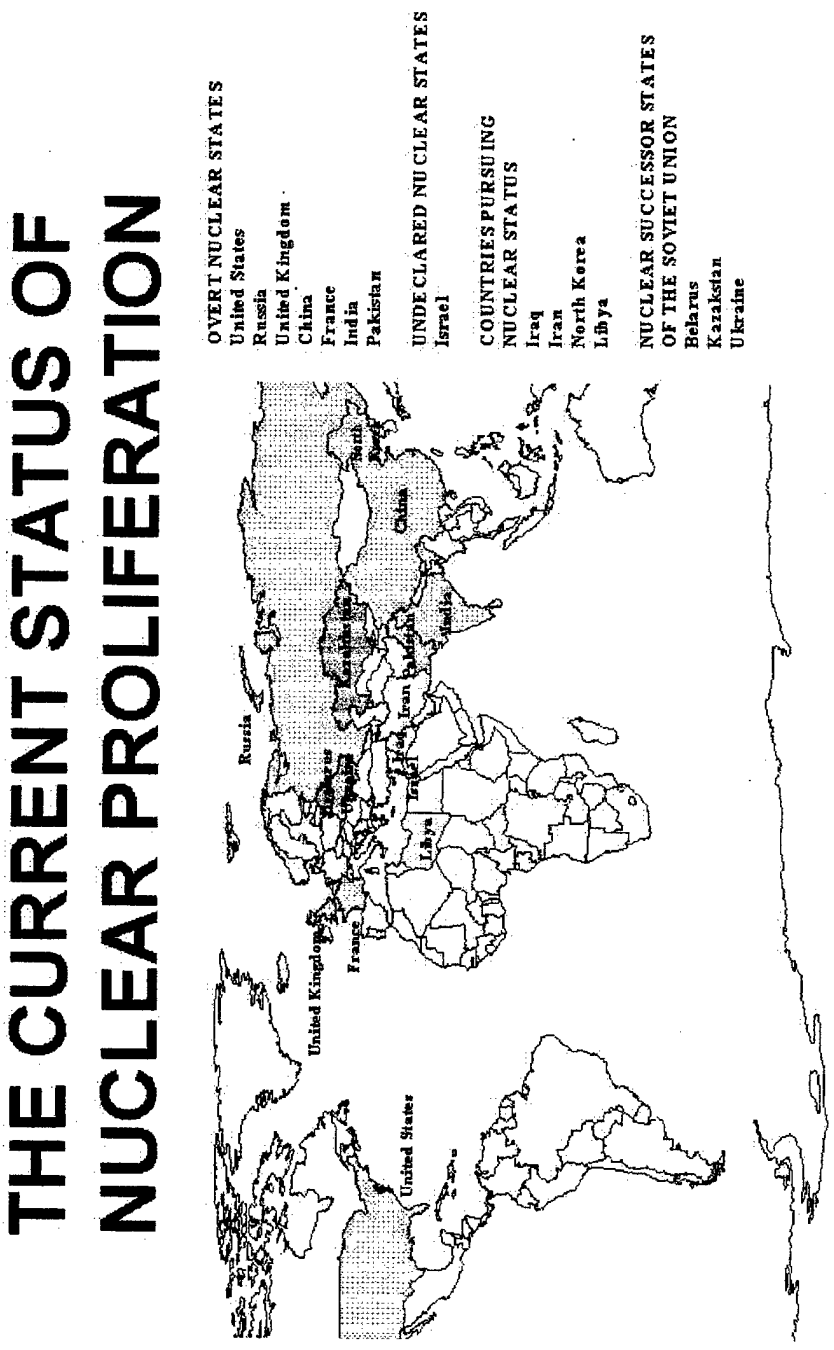

Figure 1 The Current Status Of Nuclear Proliferation

Today, our defense and intelligence services report to us through various publications that there is "a growing number of states [that] possess the requisite scientific and industrial infrastructure to initiate a weapons program,[4]" and that there are several countries that could, if they decide, begin a nuclear weapons program. Today "the number of countries that have nuclear weapons, have the capability to produce nuclear weapons, or are seeking the capability to produce and deliver nuclear weapons is approaching two dozen.[5]" This increase in the number of countries that could develop an overt nuclear weapons program has led to a situation that can be argued as posing one of the greatest threats to our national security. But, I believe that the greatest threat will come from a covert source.

In their efforts to rebuild from the economic ashes of the past, the peoples of the FSU are being tasked to their very limits as the continuing economic hardships that have become a part of daily life slowly take their toll on both the moral and physical strength of the population. Stories abound in the press of salaries for military personnel and civilians across the lands of the FSU being six months overdue, and of military units that abandon their equipment to search for food in the neighboring countryside.

This, coupled with the economic upheavals that are accompanying the painful metamorphosis from Communism to Capitalism, has led to a situation that could become one of exceptional importance and deserving of our immediate attention: the possibility that fissile material from Russia's nuclear arsenal, the *sine qua non* of a nuclear weapon, may fall into the hands of terrorist groups or rogue states.

Since the end of the Cold War, the U.S. Government has recorded numerous incidents of attempted smuggling of nuclear materials from the Former Soviet Union

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[4] National Defense University Institute for National Strategic Studies, Strategic Assessment 1996 Instruments of U.S. Power, (Fort Lesley J. McNair, Washington DC, 1996), 199.

[5] NDU, Strategic Assessment 1996 Instruments of U.S. Power, 199.

(FSU) (See Annex A). Most of these attempts, which occurred prior to 1994, were scams that involved bogus materials and were often intercepted by law enforcement sting operations or border security personnel. But some of these attempts were real.

And yet many analysts believe that the threat of "loose nukes" from the FSU is not very significant[6]. Yes, there have been several seizures of "very small" quantities of fissile material in the past, specifically in Germany in 1994. These incidents which caused some alarm bells to sound, and led quickly to various groups shouting out the warning that the dike holding Russia's nuclear material was about to burst. But authorities were quick to point-out that some of this material, if radioactive at all is useless for bomb-making and a majority of it was sold to undercover law enforcement agents[7]. The minute quantities that were suitable for a potential nuclear device were of such pure quality that investigators were able to deduce that it must have come from a research laboratory and not a military storage site and that perhaps that was the best that the smugglers could do. And since 1995, reports of such leaks have decreased significantly and, since 1997, "not a single case of stolen nuclear materials actually reaching a bona fide customer had been documented"[8].

Russia itself argues that their nuclear security apparatus is in tact and functioning properly. In an interview with the German news magazine Der Spiegle in 1995 entitled "Arrows against Russia", the vice minister of the Russian Atomic Energy, Yevgeni Mikerin, stated that the thefts of plutonium that have been intercepted in Germany were not from Russian sources at all, but were the work of people who wanted Russia to look

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[6] Rensselaer Lee, "Smuggling update", Bulletin of the Atomic Scientists, (Educational Foundation for Nuclear Science) Vol. 53, No. 3, May/June 1997, 11-14.

[7] National Defense University Institute for National Strategic Studies, Strategic Assessment 1995 U.S. Security Challenges in Transition, (Fort Lesley J. McNair, Washington DC, 199), http://www.ndu.edu/inss/sa95/sach1401.html.

[8] National Defense University Institute for National Strategic Studies, Strategic Assessment 1998 Engaging Power For Peace, (Fort Lesley J. McNair, Washington DC, 1996), 211.

bad in the eyes of the world, and so shot these 'arrows" in the form of accusations of leaking fissile material from the FSU.

When asked by the interviewer if he thought plutonium could ever be smuggled out of Russia, the vice minister stated that "In order for this to occur it would have to involve a wide-spread plot or conspiracy starting at the computer systems, all controls over production, admission to production and all the way to customs. All that would have to be bypassed, theoretically such a crime chain from production workers to customs employees is imaginable. But, careful studies from our side and also from the security apparatus confirm though, that there is not one gram of plutonium missing."[9]

There have also been fears that the "Russian Mafia" may be involved in the smuggling of fissile materials or that rogue states may be trying to obtain Russian fissile material, components or knowledge to supplement their own covert nuclear weapons programs. Many organizations and agencies do not believe this is the case and their view was concisely expressed in the annual assessment of America's strategic standing by the National Defense University (NDU) in 1995. On the issue of "Transnational Threats", the NDU led-off their assessment of the nuclear leakage trend with the heading: "Despite Worries, Little International Criminal Smuggling of Nuclear Material Has Been Detected". The section went on to state that, "Despite concerns about the involvement of Russian organized crime in the smuggling of fissile materials, none of the cases detected by late 1994 had been shown to involve Russian mafia gangs. Nor is there any evidence that material has been smuggled out of Russian military facilities, where the vast bulk of fissile material is kept.

Furthermore, no evidence has emerged to suggest that agents of rogue states or terrorist groups have been trying to purchase fissile material—although there have been

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[9] Yevgeni Mikerin, Vice Minister of Atomic Energy, "Pfeile gegen Rusland", Interview Der Spiegle, No. 17, 1995, p 32.

numerous attempted purchases by journalists, police and intelligence agents from various Western countries."[10]

All of this information to the contrary has allowed the American public to wrap itself with a false sense of security where the overwhelming majority express very little worry about the potential use of a terrorist nuclear device on American soil.[11] Unfortunately, this apathy may lead to a lack of resolve by the public to commit the significant resources necessary to defend against what I believe is a very real threat. I believe that, for the first time since the end of the Cold War, the lid to a Pandora's Box of increased nuclear proliferation has indeed been cracked-opened, and the accompanying possibility that groups and rogue states hostile to the West, taking advantage of the worsening economic situation in the FSU and one day coming into covert or illegal possession of the fissile material necessary to make a nuclear device, is the horrible vision that we may see beginning to form within.

Ambassador Robert Gallucci, U.S. special envoy on proliferation matters and former deputy executive chairman of the UN inspection team in Iraq and former chief U.S. negotiator on the framework agreement for dismantling North Korea's nascent nuclear weapons program, echoes these sentiments when he explained that one of the chief reasons that "so few nations went nuclear was that it was extremely difficult to manufacture the fissile material –enriched uranium or plutonium- required to make a bomb." And that for years, "whenever the CIA director was asked by a member of Congress how long it would take for Iran, Iraq, or North Korea to build a nuclear

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[10] NDU, Strategic Assessment 1995 U.S. Security Challenges in Transition, http://www.ndu.edu/inss/sa95/sach1401.html.

[11] A survey by the Pew Research Center for the People and the Press showed that only 13% of those Americans surveyed "worried a great deal" about the threat of a terrorist nuclear device being used against America and only 27% were "somewhat worried".

Pew Research Center For The People & The Press, "Public Apathetic About Nuclear Terrorism", www.people-press.org/terrep.htm.

weapon, he would say "about ten years – it takes about nine years to build the facilities [required to produce fissile material] from scratch, and another year to build an implosion device." Ambassador Gallucci says that the correct answer to that same question today is "I don't know senator. They may have it already."[12]

The purpose of this thesis therefore will be to evaluate the likelihood that such illegal trade in FSU fissile material could actually occur between the nuclear successor states of the Former Soviet Union and bona fide customers - states/groups which may now or in the future wish to threaten U.S. national security interests at home or abroad with an Improvised Nuclear Device (IND).

I will try to clearly illustrate this potentiality by applying the factors of trade presented by Ullman's Triad, to show first that a substance as potentially dangerous as Highly Enriched Uranium (HEU) U-235/U-238 or plutonium Pu-239 can, given the right circumstances, undergo a process of commodification. And then second, to highlight the current circumstances and situations that are contributing to this commodification, as well as speculate on possibly future situations that could influence this process.

Ullman's Triad, a spatial interaction model created by Dr. Edward Ullman, will be the vehicle for this study. It provides a basic, but rigorous framework to analyze the required interactions that must take place between two groups (one with a supply and one with a demand) for trade to occur.

Ullman's Triad consists of what Dr. Ullman saw as the three factors required for trade, in any commodity, to occur: Complementarity (supply & demand), Transferability and Lack of an Intervening Opportunity.

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[12] Jack Kelly, "Arms expert warns U.S. cities face nuclear terrorism threat", Post-Gazette, 23 January 1999.

www.post-gazette.com/headlines/19990123gallucci3.asp

Although the issue of illegal trade in FSU nuclear weapons, weapons components, and the scientific know-how to create fissile material are equally important, my efforts will concentrate primarily on the potential for trade in the commodity of fissile material itself, since much has already been written on the efforts to secure and reduce the stockpiles of nuclear weapons, such as the treaties on Intermediate Range Nuclear Forces (INF) and the Strategic Arms Limitation Talks (SALT), as well as efforts to control the transfer of nuclear knowledge and the technical components necessary to construct the infrastructure necessary to produce the commodity of fissile material.[13]

I believe that by applying the current factual evidence surrounding the issue of FSU fissile material storage, along with historical trends in terrorism, past and current nonproliferation efforts, and law enforcement capabilities to the required aspects of trade illustrated by Ullman's Triad, I can irrefutably demonstrate that if theses factors of trade are fulfilled, trade will occur, even in a commodity such as fissile material.

My thesis will first describe the nuclear problems inherited by the FSU and the potential threats they pose to our expanded global interests. I will then review trends in terrorist activity that illustrate the terrorist's historical efforts to obtain and use weapons with greater destructive potential that would provide them with greater and more effective means of accomplishing their mission.

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[13] See LA-13131-M Manual, A Handbook for the Nuclear Suppliers Group Dual-Use Annex, Prepared by the U.S. Department of Energy, Office of Arms Control and Nonproliferation, Los Alamos National Laboratory, April 1996, and Peter Zimmerman, "Technical Barriers to Nuclear Proliferation", in Zachary Davis and Benjamin Frankel, eds., "The Proliferation Puzzle: Why Nuclear Nations Spread(and What Results)," Security Studies, Vol. 2, Nos.3-4 (Spring/Summer 1993), and U.S. Congress, Office of Technology Assessment, Technologies Underlying Weapons of Mass Destruction, OTA-BP-ISC-115 (Washington DC: U.S. GPO, December 1993), and R. Adam Moody, "Proliferation Implications of the Brain Drain", Post Soviet Prospects, Vol. IV, #12, December 1996, www.csis.org/html/pspiv12.html.

I will then provide information which argues that the building of an improvised nuclear device from plans readily available can indeed be accomplished today by a determined terrorist group, state or sub-state group. The ease of construction of such a crude device will also re-enforce the proposition that the availability of an adequate amount of fissile material such as HEU or plutonium is the only factor keeping such a device from currently being built.

In the chapters on demand and supply, I'll then apply known, open-source factors to Ullman's Triad, to assist in determining what the likelihood is that such illegal trade in FSU fissile material will occur by identifying what conditions could lead to an increase in the supply-driven smuggling of fissile material as well as conditions that could lead to an increase in the demand-driven-smuggling of fissile material.

Bear in mind that when discussing the "supply of nuclear material", the quantities of such a supply will be measured in the amounts necessary to build only one improvised nuclear device. This is because the significance of the destructive capability of such an improvised nuclear weapon of mass destruction is so great that it justifies the attention required to analyze the potential that just one unit of this commodity could be traded. As Mr. Thomas MacNamara, Assistant Secretary of State for Political-Military Affairs stated during the 1996 Senate hearings on Weapons of Mass Destruction:

> "nuclear smuggling is not like other kinds of illegal trafficking. We cannot afford to have even a single case of successful smuggling of enough nuclear material for a weapon. We cannot realistically expect any strategy based only on law enforcement and interdiction to be one hundred percent effective."[14]

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[14] Prepared statement of Thomas E. MacNamara, Assistant Secretary of State for Political-Military Affairs, Department of State before the Senate Governmental Affairs Committee, Permanent Investigations Subcommittee, 22 March 1996.

The actual destructive force of an IND will be based on the amount of fissile material obtained. And the amount of fissile material needed to construct an IND will be based on the complexity of the design chosen. For a HEU-based IND, the cruder the design, the greater the amount of fissile material that will be required. Amounts required for a basic IND will therefore range around the 100 pound level.[15] This amount would produce an explosive force equal to about 10,000 to 20,000 tons of TNT.[16]

More complicated weapons designs, using neutron reflectors and special tampers, and requiring HEU amounts of 40 pounds and lower have also been postulated.[17] For plutonium used in a slightly more complicated IND, the amount can be as little as eleven pounds, which was the amount used in the Nagasaki weapon "Fat Man" in 1945.[18]

In the Chapters on transferability and intervening opportunity, I will also identify the reasons why alternate weapons of mass destruction (WMD) may be substituted by terrorists and rogue states should such trade flows in fissile material fail to materialize.

This will be followed by my conclusions in regard to the potential for the development of a black market trade in fissile material from the Former Soviet Union. I believe, that by clearly presenting the facts concerning the potential smuggling of FSU fissile material in an accepted and easily understood framework such as Ullman's Triad, public apathy towards the threat of a terrorist detonation of an improvised nuclear device

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[15] Graham T. Allison, Owen R. Cote, Jr., Richard A. Falkenrath and Steven E. Miller, Avoiding Nuclear Anarchy: Containing the Threat of Loose Russian Nuclear Weapons and Fissile Material, CSIA Studies in International Security No 12, (Cambridge, Massachusetts, The MIT Press 1996), 222.

[16] Allison, 1.

[17] A bomb that would yield half the destructive force of the Hiroshima bomb has been modeled using only five kilograms of HEU and 100 tons of explosive force could be produced with only one kilogram. Nuclear Control Institute, Washington DC.

http://www.nci.org/heuib1.htm

[18] Richard Rhodes, The Making of The Atomic Bomb, (New York:, Simon & Schuster, 1986),655.

on American soil, can be reversed and the current efforts involved in combating this threat will subsequently receive the political and public backing and support they desperately need to insure the safety of Americans at home and abroad.

CHAPTER 1: THE PROBLEM

The collapse of the Former Soviet Union (FSU) brought about some new and very difficult problems for the world in general and the United States in particular. For over forty years, the Soviet Union was one of the greatest nuclear powers on Earth, equipped with the largest arsenal of nuclear submarines and weapons in the world. Since 1956, the Soviet Union has built over 245 nuclear submarines at their five submarine construction yards: The Admiralty and Sudomekh in Leningrad on the Baltic sea, Severodvinsk in the Arctic on the White Sea near Arkhangelsk, Komsomol'sk in Siberia, and Krasnoye Sormorvo at Gorkiy[19]. But today, with the nuclear draw-down requirements of the Strategic Arms Limitation Talks (START I and the still unratified START II), the successor to this immense nuclear stockpile, the Russian Federation, is left with the overwhelming task of scrapping roughly 3000 nuclear weapons a year[20] and having to deal with "75 tons of plutonium and 625 tons of HEU"[21] as well as the radioactive components of hundreds of nuclear submarines.

THE THREAT

In addition to the obvious dangers posed from potential bomb-making components such as the solid nuclear fuel assemblies from the reactor cores of

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[19] Mark Sakitt, Submarine warfare in the Arctic: Option or illusion?, (Stanford, California: Stanford University, International Strategic Institute, 1988), 17.

[20] Graham T. Allison, Owen R. Cote, Jr., Richard A. Falkenrath and Steven E. Miller, Avoiding Nuclear Anarchy: Containing the Threat of Loose Russian Nuclear Weapons and Fissile Material, CSIA Studies in International Security No 12, (Cambridge, Massachusetts, The MIT Press 1996), 34.

[21] Allison, 35,36.

submarines[22] and the fissile material "pits" that make-up the very core of a nuclear warhead[23], the Soviet Union, who under the veil of Cold War secrecy would previously dump their nuclear waste into the sea[24], has also inherited the environmentally sensitive responsibility of dealing with the solid and liquid wastes from both the submarine and surface vessels of their decommissioned nuclear fleet. Reactor cooling liquids and pumps that are of such high contamination levels, and whose costs to reprocess in accordance with accepted post-Cold War procedures today are astronomical, are just a few of the environmentally dangerous problems they have inherited[25].

All of these nuclear components require special processing to convert them into benign forms that can be disposed of without health risk - but such processes are expensive and require specialized transportation, operations and equipment, and that means money - money that the Russian Federation simply does not have at this time.

Consequently many of these nuclear components, such as the nuclear fuel rods for the reactors, are being stored in conventional warehouses at their naval ports awaiting

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[22] For a detailed description of the bomb-making potential of reactor fuel, see J. Carson Mark, "Explosive Properties of Reactor-Grade Plutonium", Science & Global Security, Vol. 4, No. 1, (1993), pp. 111-128.

[23] For a detailed explanation of the bomb-making potential of weapons "pits", see Graham T. Allison, Owen R. Cote, Jr., Richard A. Falkenrath and Steven E. Miller, Avoiding Nuclear Anarchy: Containing the Threat of Loose Russian Nuclear Weapons and Fissile Material, CSIA Studies in International Security No 12, (Cambridge, Massachusetts, The MIT Press 1996).

[24] Douglas L. Clarke, "Naval Nuclear Waste Poses Immense Risk", Transition, Vol.1/21, (17 November, 1995), 34.

[25] For a complete review of the environmental dangers of naval nuclear waste, see Thomas Nilsen and Nils Bohmer, Sources to radioactive contamination in Murmansk and Arkhangel'sk county, The Bellona Report, Volume 1, 1994.

transport to Russia's reprocessing plant located at the Mayak Production Association (the former Chelyabinsk-65) or at numerous other sites as shown in the figure below.[26]

But, as David Hoffman, reporter for *The Washington Post* has reported in the November 21st, 1998 issue of *The Seattle Times,* the fact that there are over 50,000 such fuel assemblies on the Kola Peninsulas alone means that it would "take decades to remove the mountain of spent nuclear fuel that has already accumulated."

Furthermore, the routine and treaty-required dismantelment of strategic and intermediate-range nuclear missiles also means that at sites such as the Zheleznogorsk Mining and Chemical Combine, (the former Krasnoyarsk-26), Tomsk-7 and the many other formerly secret cities shown in figure 2, the fissile components of these weapons are also being stored until such time as money and resources will allow for their proper disposal. At the Tomsk-7 and Chelyabinsk-65 sites, the fissile material pits, the very heart of a nuclear weapon and the one component previously unattainable by rogue states and terrorists, were, in 1991, "piling up by the thousands"[27].

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[26] Fissile material is being stored at over 40 locations through-out the FSU. See Appendix B for complete listings.

[27] Andrew & Leslie Cockburn, One Point Safe, (New York: Anchor Book Doubleday 1997), 42.

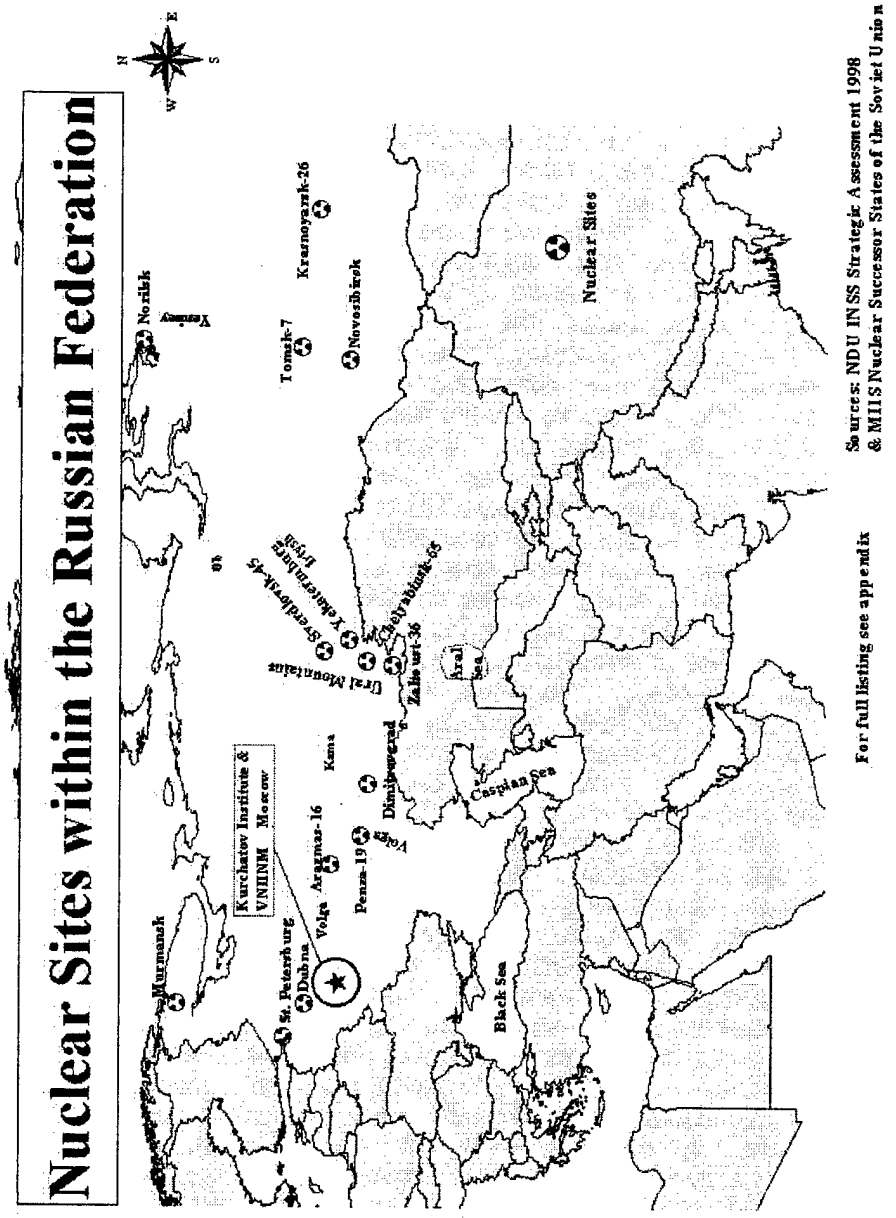

Figure 2 Nuclear Sites Within The Russian Federation

The problems facing the former members of the Soviet Union following it's collapse are many and varied. The nuclear successor states of the Soviet Union are faced with, among others, the many problems surrounding their nuclear stockpiles, while the satellite countries of the former Warsaw Pact like Poland, Hungary and the Czech Republic are struggling to find their place in what President George Bush referred to as "The New World Order".

How dangerous is this nuclear problem in Russia? Could this material find its way into the hands of terrorists or rogue states who would use it? If so, is this a Russian problem only? How does this potential problem affect other countries in general and the United States in particular? As we begin to expand our role in the world, how vulnerable are we becoming to nuclear terrorism?

These are just some of the critical questions that will require answers in the future. This project will attempt to lay some of the groundwork necessary to find those answers.

INCREASED VULNERABILITY: THE GLOBALIZATION OF U.S. NATIONAL INTERESTS

The collapse of the Soviet Union has left the United States in a very dominant position, surrounded by allies who are also among the strongest economic, military and political countries of the world. Together, the free-market democracies have expanded their businesses, and the military alliances necessary to protect them, in an ever-expanding global presence characterized by the emergence of trans-national corporations and industries.

The simple fact that the United States leads the world technologically, economically and militarily[28], coupled with the comforting fact that Americans will never

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[28] NDU, Strategic Assessment 1998 Engaging Power for Peace, xiii.

have to serve in any armed conflict that would result from their foreign policy decisions[29], has also lead to a penchant by many Americans, rightly or wrongly, to use these advantages and benefits to take on greater global leadership roles and responsibilities, and to champion causes such as attempting to quell civil strife in Somalia, combating starvation in Rwanda, attempting to restore democracy to Haiti, and standing guard over a fragile peace among former warring factions in both Europe and the Middle East. This has led to the positioning of American troops across the globe.

This new-found status in the post Cold War era has also led to the development of new global coalitions of free-market democracies that have also been willing to send their forces to war to engage the government forces of sovereign nations in an effort to force them into compliance with various accepted humanitarian practices. In addition the free-market democracies have also been willing to station troops indefinitely on the ground or in the air to enforce that compliance[30].

But because of America's willingness and desire to continue expanding its global presence and assistance, it has placed itself in a position where it may become more susceptible, and even vulnerable in the future, to the effects of problems and conditions that occur in countries outside American borders, as well as from problems that may arise from American citizens unhappy with this new global position.

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[29] The United States is currently working to maintain an "All Volunteer" force, which means that any decision made by the American electorate which carries the possible price of armed conflict and it's inevitable casualties as it's penalty, will be borne, not by the electorate, but rather by volunteers only. However, the armed forces are currently struggling to fill their ranks and have seriously begun to consider allowing high school dropouts to fill the void.

[30] The first use of this post Cold-War coalition warfare was to oust Saddam Hussein from Kuwait. This has been followed by the coalition bombing of Serbia to combat "ethnic cleansing", as well as the continued enforcement of the No-Fly rules in both northern and southern Iraq and the continued presence of troops along the Korean peninsula's demilitarized zone (DMZ).

To try to prevent or mitigate such problems, the United States has deployed forces across the globe as illustrated in figure 3, to support friends and allies alike in numerous countries and will therefore no longer focus her economic, political and military efforts solely on the United States and its territories to secure the well-being and way of life of her citizens, as many isolationists would like, but rather must continue to increasingly turn her attention and efforts outward to insure the stability and well-being of her neighbors and allies to secure the multilateral ties she has developed. And it is this expansion of American military presence that has led to our increased vulnerability to attack by rogue states and terrorist groups.[31]

This globalization of American interests was made clear in April of 1999 during one of many speeches given to support the reason for the NATO bombing against Serbia by representatives of the Clinton administration. President William Clinton used several opportunities to inform the American electorate that the instability in Serbia affects the stability of Europe which in turn affects the stability of America.

Therefore, the active maintenance of stability in countries and regions outside American borders, such as those current and potential trouble-spots shown in figure 4, may be determined in the future to be in our own national interest. And any threats (military, economic, political, humanitarian) to these countries or regions may be translated, based on circumstances, as threats to our own national security.

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[31] A prime example was the Khobar towers attack against American forces stationed in Saudi Arabia in June of 1996.

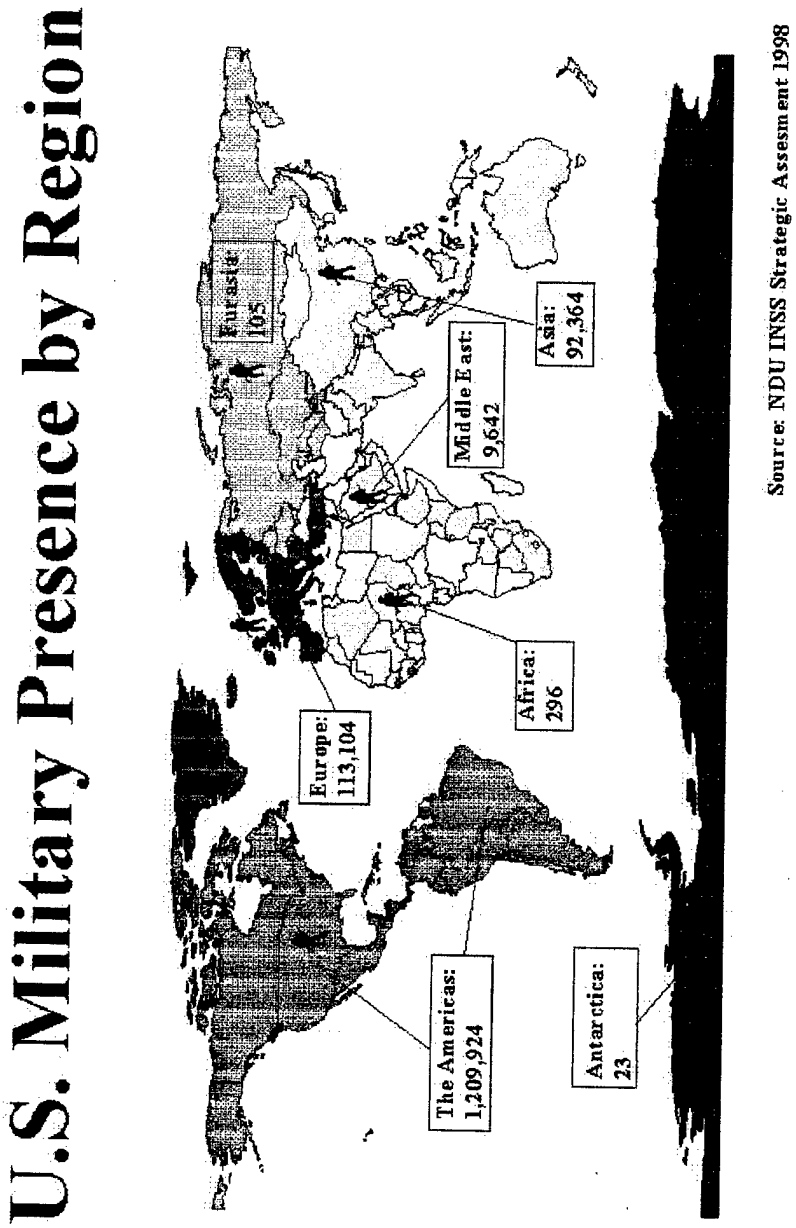

Figure 3 U.S. Military Presence By Region

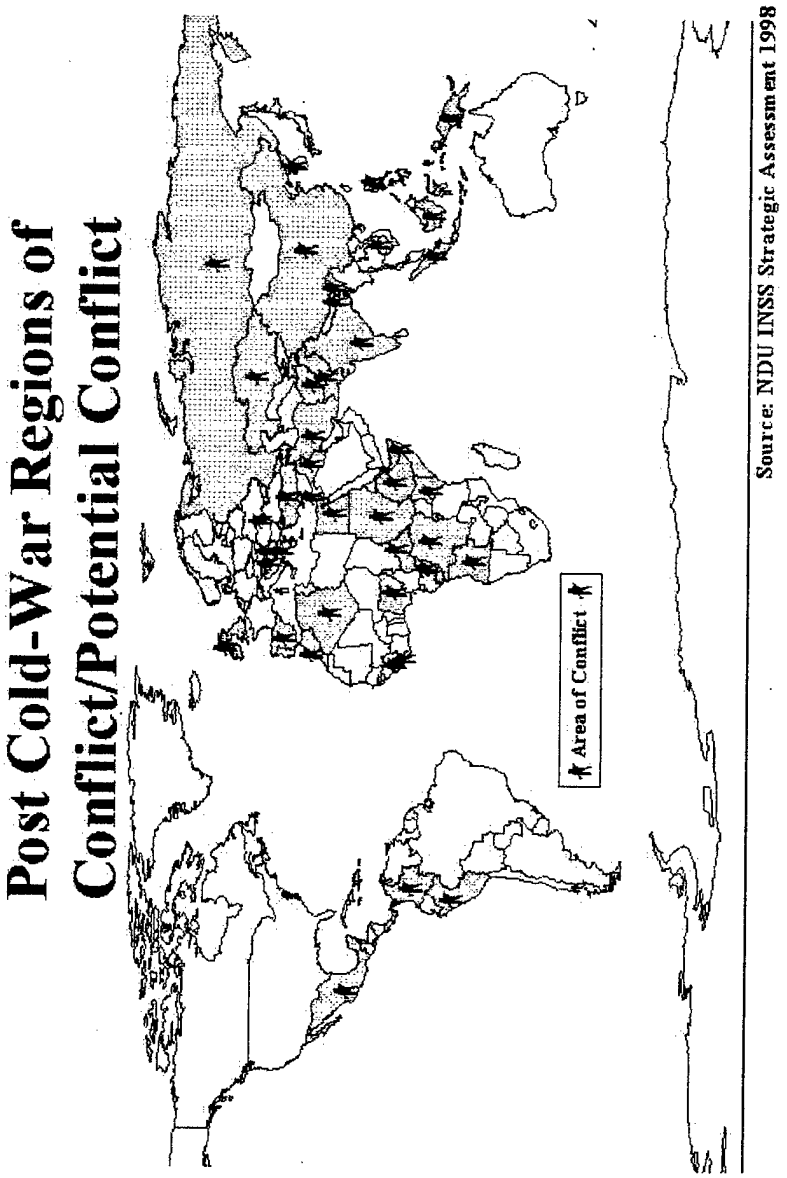

Figure 4 Post Cold War Regions Of Potential Conflict

The question now arises whether we can predict where such threats to our new national and international security may come from, both now and in the future. One obvious and demonstrated answer is from terrorist groups.

Much of the new terrorist threat we may face in the future will be based on religion and religious fundamentalism such as the attack on the World Trade Center in New York in 1993, the Military barracks of Khobar Towers in Saudi Arabia in June of 1996, and even the attack against the Alfred P. Murrah Federal Building in Oklahoma City in April of 1995 was a religious attack against a secular government[32]. And the attacks against the American embassies in Africa in 1998 were in retaliation to the U.S. attacks against the headquarters of terrorist Holy Man Osama bin Laden in Afghanistan and the Sudan.

In July 1997 Marine Lieutenant General Anthony Zinni, future commander of forces deployed in the Persian Gulf told the Senate Armed Services Committee that United States troops in Saudi Arabia are being regularly stalked by terrorist groups who may be planning another attack. LTG Zinni stated " I feel that we are being stalked. There will be other tries, I'm convinced"[33]. Reporter Neil Lewis, stated in his piece on LTG Zinni, mentioned above that, the "widespread view among intelligence and law enforcement officials is that the 5000 U.S. troops deployed in Saudi Arabia remain a tempting target for terrorist groups.[34]"

But we are also beginning to see home-grown acts of terror as evidenced by the Oklahoma city bombing and the planting of a bomb at the Olympics in Atlanta.

Also reported in the above July 97 issue of The Stars and Stripes was the foiled attempt by members of a paramilitary group to attack Ft Hood Texas where they believed

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[32] Hoffman, Inside Terrorism, 199,200.

[33] Neil A Lewis, "We are being stalked in gulf" The Stars and Stripes Fri., Jul 11, 97, 1.

[34] Lewis, 1.

UN troops were stationed. Agents from 4 states working together confiscated rifles, pistols, silencers, two machine guns, ammunition and 12 pipe bombs. This group, along with others had been participating in the "Third Continental Congress" in Independence Missouri., an April 1997 gathering of militia groups who were planning on how to set up a provisional government once the current US Government collapsed. The seven members of the unnamed militia group were striving to help it along through various types of terrorist acts.

In addition to asking the question of who, we must also ask ourselves the question whether these terrorist candidates would be willing to use weapons of mass destruction against American targets. The answers to such questions are difficult, but not impossible to speculate upon.

With the bombing of the World Trade Center in New York and the bombing of the Murrah Federal building in Oklahoma city, the United States has recognized that there is an increased potential for a WMD attack upon American soil. This heightened possibility in the United States has been brought about by several key factors which were outlined in Presidential Decision Directive 39 which was implemented to "ensure that the United States is prepared to combat domestic and international terrorism in all its forms."[35] Those factors are presented here:

- Inexpensive production and availability of chemical/biological(C/B) agents
- Easily obtainable chemical precursors and biological production processes
- Portability of small amounts of C/B agents especially useful for clandestine purposes

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[35] Report to Congress on Responses to Threats of Terrorist Use of Weapons of Mass Destruction January 31, 1997, Unclassified background information on PDD-39, Originating Headquarters: FBI Headquarters, Domestic Terrorism Weapons of Mass Destruction Operations Unit.

- Potential for large-scale public impact based on limited ability to quickly identify and/or contain the effects of such substances
- Increased WMD stockpiles, with the potential for theft or acquisition of the weapons by terrorist groups
- Capability of inflicting mass casualties
- Increased media coverage of the use of WMD

I submit that the potential for theft from the "at risk" WMD stockpiles in the FSU pose two basic threats to U.S. national security with regard to nuclear weapons of mass destruction. The first threat, and the primary focus of my thesis, is a covert one, posed by the potential smuggling of fissile material from the nuclear successor states of the Soviet Union and it's subsequent use at the hands of rogue states or terrorist groups against American targets. The second threat is an overt one, caused by the political value of possessing nuclear weapons and the potential for their subsequent proliferation which could be fueled by the possible sale of FSU fissile material, production equipment or scientific knowledge.

In the next chapters, I will focus on the threat posed by terrorists and rogue states who may come into possession of a nuclear WMD and the trends in their willingness to use ever-greater and more powerful weapons as a means to achieve their goals.

CHAPTER 2: TERRORISTS, ROGUE STATES AND THE HIERARCHY OF TERROR

During the 60s, 70s and 80s the world's democracies were plagued by politically-motivated terrorist groups, religious fanatics, and terrorist groups working as proxies for rogue states and the former Soviet Union. These acts of terrorism became more and more violent as time, funding and available products and delivery techniques became more readily available. Yet certain limits were always in place. Most terrorists were content with the use of their small arms and explosives of various sizes as the tools needed to accomplish their goals. As terrorism expert Brian Jenkins noted "simply killing a lot of people has seldom been one terrorist objective...Terrorists operate on the principle of the minimum force necessary. They find it unnecessary to kill many, as long as killing a few suffices for their purposes."[36] Yet today we have begun to see a move towards a more violent and bloody phase of terrorism whose roots can be found; not in secular political beliefs, but in religion.

The correlation between the various techniques available to terrorists and their ability to control ever-increasing population sizes can be viewed in what I refer to as the Hierarchy Of Terror (see figure 5).

The Hierarchy Of Terror illustrates the relationship between the technique a terrorist may choose to use to accomplish his goal, and the relative size of the target area that can be effectively attacked.

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[36] Bruce Hoffman, Inside Terrorism, (New York, Columbia University Press, 1998), 199.

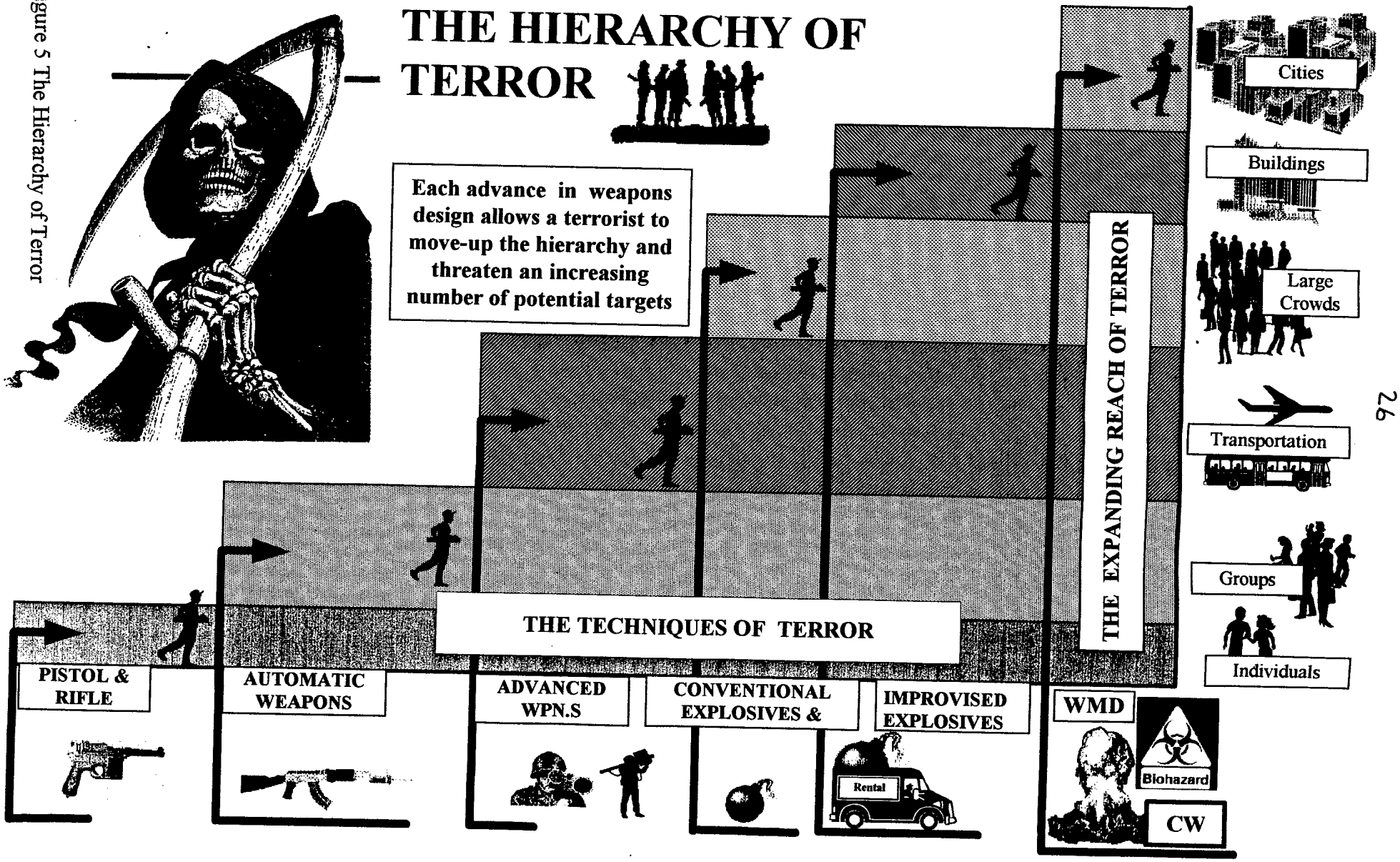

Figure 5 The Hierarchy of Terror

Of significant interest is the fact that the increased levels of violence used by terrorists to accomplish their mission mirrors the increased availability of new and more deadly means of holding larger and larger groups of people hostage, in an effort to force a region or country to meet the terrorist's demands.

The Hierarchy Of Terror starts at it's lowest level with the employment of various types of small arms and advances upwards in steps based on each new technological development in weaponry or technique and it's potential availability to the terrorist group or rogue state:

- The single-shot rifle and pistol. Weapons easily available but which require the terrorist to be physically present at the scene. Only capable of holding small numbers of people hostage. This type of act usually requires a terrorist willing to give his life for the cause during the hostage taking or hijacking. In the event the terrorist's demands are not met, the damage to surrounding property would be minimal.

- The automatic rifle and machine gun. More difficult to obtain within many countries, it usually has to be smuggled in from terrorist-sponsoring countries and again requires the terrorist to be physically present at the scene. But the terrorist is now capable of holding larger groups hostage in an enclosed area or simply reaping numerous victims with scythe-like efficiency from crowded streets and buildings. Minor damage would result to surrounding property .

For both of the above steps on the hierarchy, the results for the terrorist was dramatically increased if the act could involve the hijacking of an in-flight airliner. However, because the international community was firmly entrenched together in their opposition to hostage taking and air piracy, and because they were willing to fund the necessary security apparatus which included x-ray machines for people and luggage in airports and the training of special military units, the terrorist, unable to hide his act more often than not met with death at the hands of a hostage rescue team rather than having his

demands met or his message broadcast. Such overwhelming retribution against the hostage takers, hijackers and the sponsoring countries, especially during the 1980s soon led to a change in terrorist tactics. The terrorist began to take advantage of new assets which would allow him to remain safely out of the immediate area as shown in the next step of the hierarchy:

- Advanced shoulder-fired weapons. The availability of weapons, such as the Russian-made RPG-7, 16, and 18 armor-piercing rocket propelled grenades, and the potential availability of anti-aircraft weapons like the shoulder-fired American Stinger (possibly obtained from Afghanistan) or the Russian-made SA-7 Grail or SA-14 Gremlin would allow the terrorist to attack a hardened target or aircraft from a great distance which would then increase their chances of survival.

The addition of advanced stand-off weapons like the RPG did provide the terrorist with an increased chance of survival, as well as providing a greater means of destruction. However, they still required the terrorist to be in the general vicinity of the attack and therefore subject to retaliation at the hands of a well-trained rapid response force. This led to the increased adoption of weapons which would allow the terrorist to make his attack while remaining safely hidden during it's actual execution - conventional and unconventional explosives.

- Conventional explosives: bombs using explosive materials such as black powder, TNT and C-4 (plastic explosive) can sometimes be difficult to obtain without the proper connections but are very easy to employ. They are effective at striking larger targets, such as crowds, and are capable of destroying everything within their effective radius which will be dependent on the type and amount used. Such bombs are very versatile and can be modified and planted almost anywhere. Their employment is limited only by the imagination of the terrorist and his ability to carry and plant the bomb and they can be rigged with booby-traps to foil their dismantelment by law enforcement in the event they are discovered. Severe damage

would result to the façade and interiors of surrounding property or the complete destruction of an edifice, if enough explosives were available.

- A derivation of the man-portable type is the car or truck bomb, a vehicle filled with conventional explosive which would greatly increase the amount of explosive that could be employed in a particular attack and could result in the ability to destroy much larger targets. A prime example of this type was the World Trade Center bombing in New York.

- Another derivation of the man-portable bomb is the explosive-filled checked luggage bomb on-board an aircraft such as the bomb that brought down Pan-Am flight 103 over Lockerbie Scotland in 1983. The C-4 explosive had been packed inside of a portable audio device. Fortunately funds have been made available to support the development of better airport defensive technologies which are producing better screening devices for explosives such as C-4 and TNT.

As demonstrated in the steps above, the new tactics of terror no longer required the terrorist to be physically present. The group also stands a reasonable chance of remaining in the darkness hidden behind a shield of deniability. They could park a vehicle bomb in a basement parking garage, make their demands known to the media accompanied with the threat that they are holding an unsuspecting office building and all its occupants hostage. But if their demands are not met or if they choose to simply detonate their device, then they still stand a chance of being identified.

If their conventional explosive device was improperly constructed and failed to detonate or was built of traceable components, the sponsoring country could be identified through evidence recovered at the scene and swift retribution could be meted out. Such was the case in the Libyan-sponsored bombing of the La Belle disco in West Berlin, a social gathering place for off-duty American soldiers stationed in the American sector. A Libyan team placed a conventional explosive device at the disco and allowed it to

detonate. Analysis of the forensic evidence that remained at the blast site pointed unmistakably to Libyan involvement and led to the subsequent retaliatory attack on the Libyan capital by US warplanes. US investigative techniques have also pointed to Libya as the cause for the downing of Pan-Am flight 103. This may be one reason (cost would be a second) why some groups may choose to construct unconventional bombs using untraceable components.

- Unconventional explosives: Bombs produced with readily-available materials such as nitrogen fertilizer and diesel fuel have provided the terrorist with the greatest explosive potential to date and at the least cost. Although not, by definition a WMD a fertilizer bomb is the closest of the conventional terrorist weapons to a WMD in terms of casualty-producing capabilities and is also the easiest to produce, least costly and consists primarily of untraceable components.[37] This weapon consists of very easy to obtain common materials with normal functions. These same materials can be very difficult to trace during the follow-up investigations but, when mixed together in the proper amounts and packed into a large vehicle, such as a moving truck, this volatile combination, when parked in a building's underground parking garage, is capable of bringing down extremely large structures or holding large buildings and their unsuspecting occupants hostage. The effective radius of such devices has been significantly increased over the conventional TNT-type car bombs used in the past and damage, bordering on total loss could result to structures within the target area depending on the amounts used. Perhaps the greatest example of the use of such a device was the Oklahoma City bombing in April of 1995.

The experience and techniques used and passed on by various groups have also kept-up with the changing times and provided many terrorists and rogue states with new and more frightening capabilities for holding even larger groups hostage or for making a

[37] There have been discussions concerning the possibility of introducing taggants into fertilizers that will allow the tracing of an unconventional explosive back to the buyer of the fertilizer.

more dramatic statement. These steps on the hierarchy fall into the category known as Weapons of Mass Destruction (WMD).

The term WMD is defined in the 1996 Strategic Assessment as follows:

> "The term "weapons of mass destruction" (WMD) refers to nuclear, biological, and chemical weapons employed for the purpose of inflicting massive damage, including the killing of large numbers of civilians. The term consolidates nuclear, biological and chemical weapons into one category because, despite differences in their effects and use, they share enormous lethality and symbolism."[38]

Because of the extremely large number of potential casualties or hostages that could result from the use or threatened use of such weapons the terrorist could be assured that the use of a WMD such as the ones described below would both impress and frighten the populace and in so doing, generate the maximum amount of publicity possible for their message. A noted authority on terrorism, the late Dr. Frederick Hacker stated that "terrorists seek to frighten and, by frightening to dominate and control. They want to impress. They play to and for an audience, and solicit audience participation"[39]. No other terrorist asset in the Hierarchy Of Terror can generate such "enormous symbolism" or fear in the hearts of a city's population.

These weapons fall into three distinct categories:

- Biological weapons such as Anthrax, plague and others require a certain amount of expertise which can be found, according to one Palm Desert health official, in some

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[38] NDU, Strategic Assessment 1996 Instruments of U.S. Power, 201.

[39] Hoffman, Inside Terrorism, 130.

senior medical students but are still difficult to produce, deliver and control[40]. But such weapons are capable of reaping large numbers of casualties although in a more subtle, less dramatic way. There inherent uncontrollability may preclude their actual use as the weapon of choice but may still serve as a viable threat device. A prime example of this was the pre-Christmas Anthrax attack against a shopping mall store in Palm Desert, California in 1998 in which I was a direct witness to. This attack, closed down the entire area and required decontamination of over 100 patrons and store employees. According to Hazardous Materials officials cited in the December 25th edition of the local newspaper *The Desert Sun*, although they could not rule-out the possibility that this threat was real, "no source or evidence of anthrax contamination [as of this writing] had been found"[41]. Three other Anthrax threats were received in 1998 in Southern California alone which resulted in quarantines and decontamination for over 1, 610 Californians[42] All three cases were later identified as hoaxes but, these threatened attacks, although hoaxes, still prove the power of such threats to disrupt lives, force the expenditure of much needed funds and resources and still gain press coverage for the message of a group or individual.

- Chemical weapons such as Blister agents or the deadly Nerve agent Sarin are difficult to produce without the proper laboratory equipment and expertise, but very effective in threatening certain parts of cities and exacting huge numbers of casualties from enclosed areas such as subways and malls without destroying the surrounding property. Again not as dramatic as a nuclear WMD, a chemical attack can derive some of its dramatic effect from the suffering of it's victims as broadcast on national media

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[40] Conversation with a Palm Desert health official during December 24th 1998 Anthrax alert at the Palm Desert Mall .

[41] David Hermann, "Anthrax threat forces quarantine of shoppers," *The Desert Sun* , December 25th, 1998, A1.

[42] Hermann, A12.

- Nuclear weapons such as an improvised uranium-gun bomb, implosion bomb or the radiological bomb, will succeed in achieving both massive casualty numbers and extensive physical destruction and will be discussed in greater detail in the following chapters.

Although many terrorist groups have considered the possible use of a WMD which would cause such vast and indiscriminate death, none had actually employed such a weapon until recently. There have been some incidents in the past such as the Palestine Liberation Organization's 1979 effort to poison Jaffa oranges to destabilize Israel's economy or the 1980 attempt by a cell of the Red Army Faction in Paris to cultivate a biological culture for use as a weapon[43] but none of these yielded the number of casualties that are associated with the previous definition of a WMD which describes a weapon capable of "inflicting massive damage [and killing] large numbers of civilians"[44].

Instead, the first real use of a WMD was the Sarin gas attack in Tokyo, Japan in March of 1995. This incident is significant in terrorist history because it was the first WMD attack against a modern major city.[45] And although the attack was bungled and the casualty rate was minimal, it is important to recognize the cold hard fact that this religion-based group was mentally prepared to unleash a WMD and accept the potentially horrendous number of casualties from a successful gas attack to achieve its political and religious goals. This group was the first terrorist group to take that next step up the

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[43] Hoffman, Inside Terrorism, 198.

[44] NDU, Strategic Assessment 1996 Instruments of U.S. Power, 201.

[45] In his 20 March, 1996 statement before the Hearing of the Permanent Investigations Subcommittee of the Senate Governmental Affairs Committee on the subject of Weapons of Mass Destruction, then CIA director John Deutch stated that "the attack by the Japanese cult Aum Shinrikyo is believed to be the first terrorist deployment of a chemical weapon of mass destruction on a civilian population. Coincidentally, that tragic attack occurred on March 20th, 1995. One year to the day later, I can say that we have left the realm of the unthinkable; these are no longer theoretical concerns."

Hierarchy of Terror. This is significant and we should not assume that a religious group such as this, which was morally willing to accept such casualties, is an aberration.

CHOOSING A TECHNIQUE FROM THE HIERARCHY OF TERROR

Now, due in large part to increased international security efforts and improvements in investigative techniques with regard to crime scene analysis which has deterred many terrorist acts, we have begun to see an overall decline in acts of international terrorism which, after the end of the Cold War, "fell to a 25-year low in 1996."[46] But, although "the number of incidents is on the decline, casualties from them appear on the rise as terrorists use increasingly lethal explosives."[47]

With each new advance in technology, the ability of the terrorist to affect a larger number of personnel becomes greater as does their ability to make their message known. And, despite the fact that a new method of terror may be more complex, the terrorist knows that the knowledge to carry-off it's use is out there somewhere and available for a price. But there are other factors which must be considered and so this results in a requirement by the terrorist group to evaluate its particular situation, finances and risk tolerances and determine which technique will be right for their situation.

In the two figures below I present a relative comparison of the terrorist techniques presented in the Hierarchy of Terror to four basic factors which a group, which has decided to strike a target, must consider when choosing a terrorist technique. In figure 6, the Terrorist Scale of Relative Complexity and Cost, the terrorist compares the cost of obtaining a technique with the amount of complexity that will be required to employ that technique. And in figure 7, the Terrorist Scale of Relative Vulnerability and Deniability

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[46] NDU, Strategic Assessment 1998 Engaging Power For Peace, 207.

[47] NDU, 207.

the terrorist compares his vulnerability to capture or death when carrying out the act using a particular technique, with his ability to maintain plausible deniability.

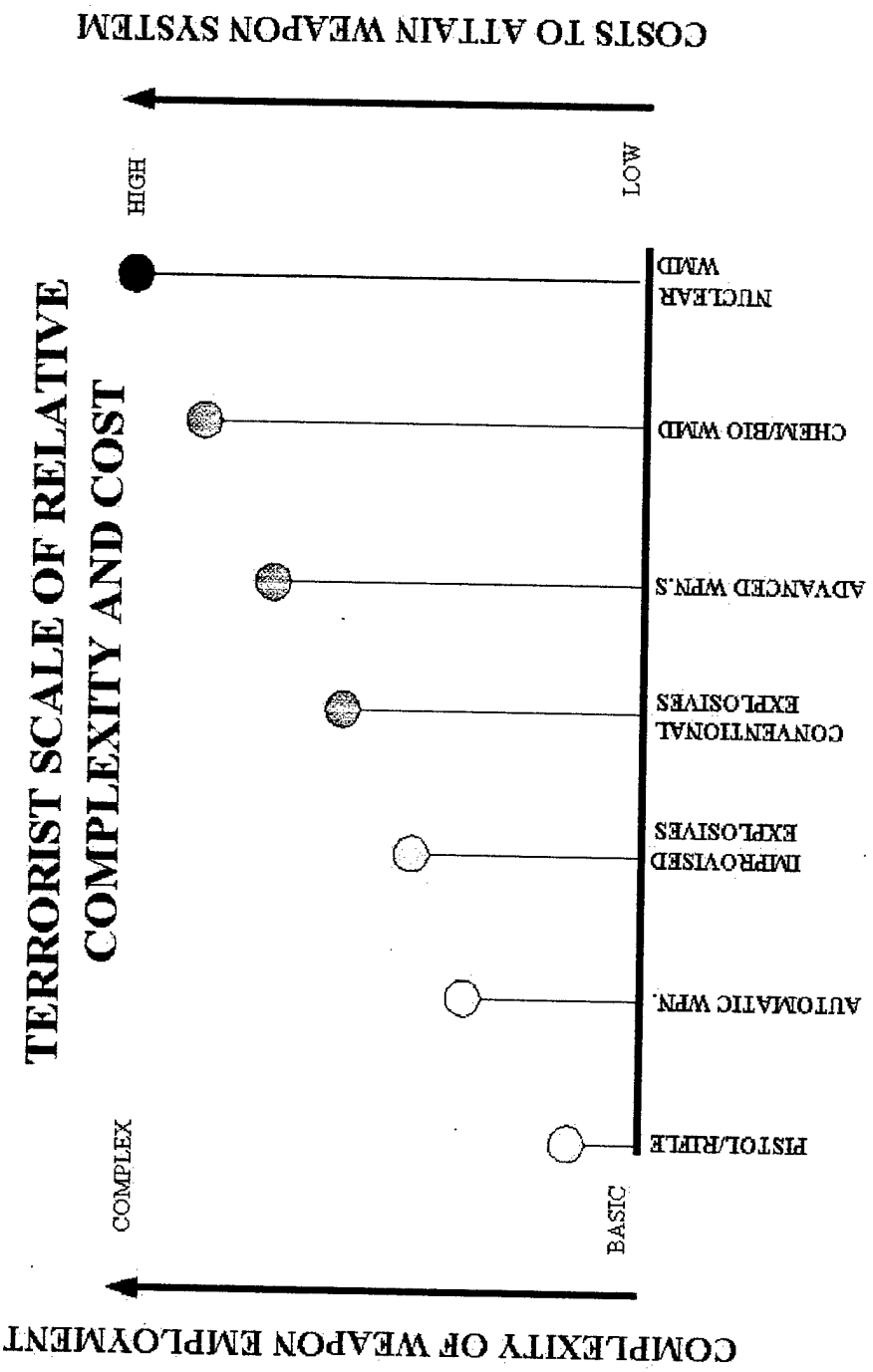

Figure 6 Terrorist Scale Of Relative Complexity And Cost

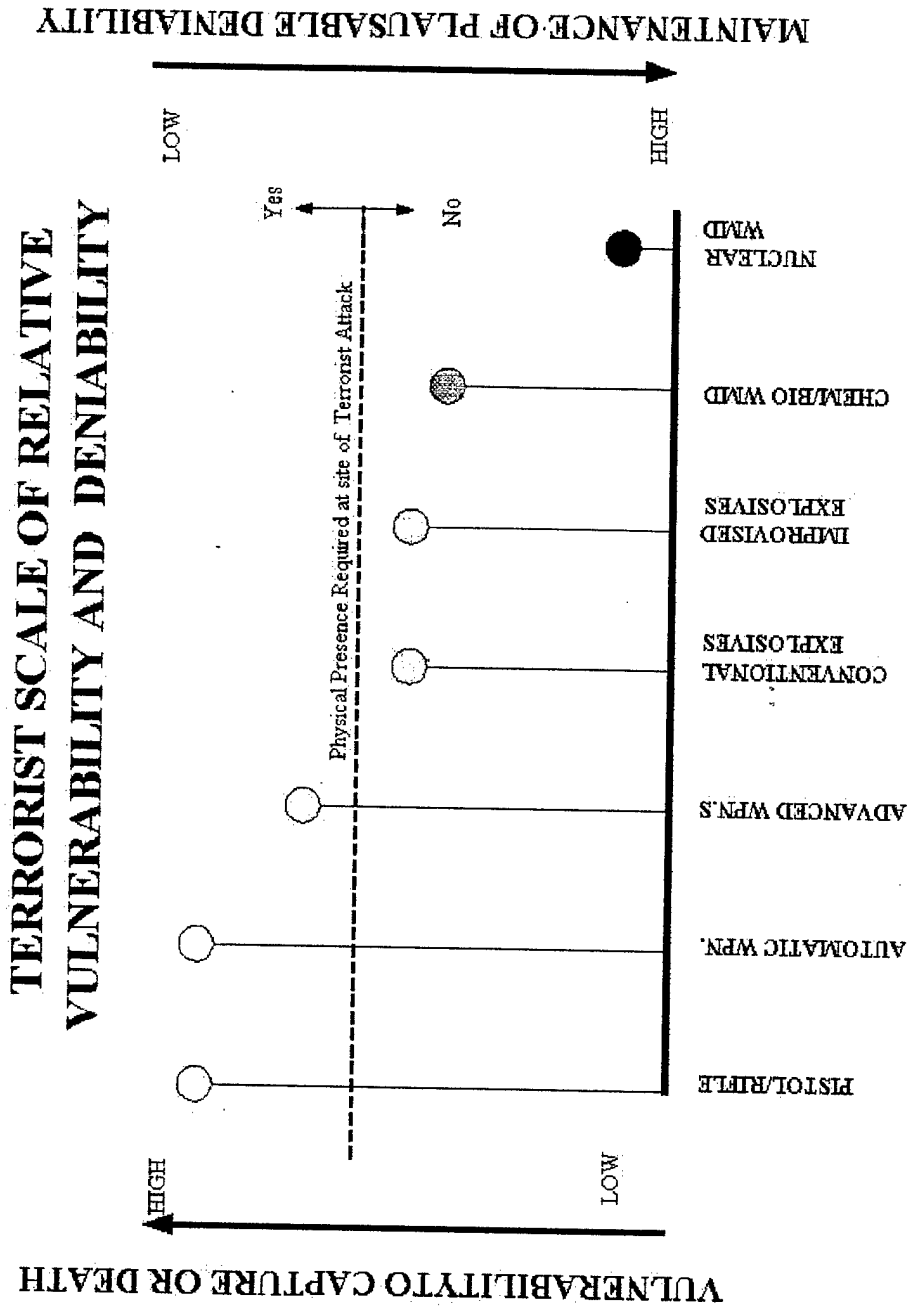

Figure 7 Terrorist Scale Of Relative Vulnerability And Deniability

Bear in mind that the weight that a group gives to each factor will be different for each type of group. In addition, as alluded to in the Hierarchy of Terror, an added bonus for using techniques located higher up the Hierarchy of Terror is the decrease in the requirement for the terrorist to actually be physically present to carry-out the attacks. Likewise, the greater the chances of the perpetrators not being discovered, and so actually getting-away with the attack, also increases the higher-up the hierarchy the terrorist chooses to move.

For example, an Islamic extremist group, financed by a wealthy terrorist such as Osama bin laden, will not have to place a lot of weight on cost. If they are willing to die in the service of their god, vulnerability to capture or death may not be heavily-weighted either. And if they are a group without borders and unsponsored, such as the group led by Osama bin laden, maintenance of plausible deniability will again receive little weight.

Such a group would therefore be capable of using any of the techniques in the Hierarchy it could obtain. But if the group is not well-financed, then cost will be given a greater weight. Likewise if the group is well-financed but state-sponsored or exists only within the boundaries of a particular region, such as the Palestine Liberation Organization located in Palestine or the Irish Republican Army located in Northern Ireland (used here only for example), then the maintenance of plausible deniability in the face of advanced forensic evidence gathering techniques will receive the greatest emphasis and perhaps only a nuclear WMD, if available would be chosen since it provides the highest level of plausible deniability maintenance.

On the other hand, a self-financed secular militia movement in the United States may give heavier weights to cost and vulnerability to capture or death and so may be forced by their situation to choose some type of improvised explosive and will take their chances with regard to the maintenance of plausible deniability.

Remember that the choice of technique used by the terrorist to accomplish his mission will take all of these elements into consideration and evaluate them against the size and location of the potential target, the risks the terrorist and his backers are willing to assume and the ultimate goal desired. In all cases, the groups will want the greatest impact-producing technique that their situation will allow.

Looking back at the breaking of the WMD barrier in Tokyo we can see that this was a significant event in which a terrorist group was able to quietly establish for itself a situation that allowed it to chose a technique from the highest ends of the Hierarchy and in so doing, opened the door to the possibility that other terrorist groups may also be out there quietly establishing their situations and may one day attempt to gain access to the ultimate weapon perched high on this hierarchy and capable of holding an entire city hostage - a nuclear device.[48] And, as was pointed out earlier, the means to achieve that goal may be found at sites in the FSU such as Tomsk-7 and Chelyabinsk-65 nuclear

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[48] Documents recovered by Japanese police in the investigation of Aum Shinrikyo involvement in the Tokyo subway Sarin gas attack reportedly indicated that the terrorists were collecting information on uranium enrichment and laser beam technologies. A spokesman for Russia's prestigious nuclear physics laboratory, Kurchatov Institute, acknowledged that at least one Aum Shinrikyo follower was working at the institute. From U.S. Government Chronology of Nuclear Smuggling Incidents 1993-1996, 20 March 1996, Testimony by CIA Director John Deutsch before the Senate Permanent Investigations Subcommittee on global proliferation of weapons of mass destruction and illicit trafficking of nuclear materials.

storage and reprocessing sites where the fissile material pits, the very heart of a nuclear weapon were, "piling up by the thousands"[49].

What is the significance of this mountain of fissile material? And, if a sub-state group or terrorist organization such as Aum Shinrikyo were able to obtain one of these "pits", would they be able to turn it into a usable nuclear device?

[49] Cockburn, One Point Safe, (New York: Anchor Book Doubleday 1997), 42.

CHAPTER 3: FABRICATING A NUCLEAR DEVICE: ROCKET SCIENCE OR THE STUFF OF BOY SCOUTS?

Although two dozen is a large number when discussing the National Defense University's Strategic Assessment of states who may have a potential nuclear weapons capability by the year 2000[50], the fact remains that the development costs of an independent nuclear capability are astronomical and often prohibitive to most countries. This fact, in and of itself, has kept the number of "Nuclear Club" members down and prevented the spread of nuclear weapons.[51] But the potential spread of illegal fissile material from the FSU can change that fact literally in a matter of weeks or even days. To understand why illegal fissile material could change the balance of power and increase the threat posed by the rapid spread of nuclear weapons, it is important to understand how critical to the bomb process fissile material really is and why it must be safeguarded at all costs.

THE CRITICAL NATURE OF FISSILE MATERIAL

To appreciate the critical role that fissile material plays in the quest for a nuclear weapon by various states or groups, it is important to look at the costs that the United

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[50] NDU, Strategic Assessment 1996 Instruments of U.S. Power, 199.

[51] Ambassador Robert Gallucci, U.S. special envoy on proliferation matters and former deputy executive chairman of the UN inspection team in Iraq and former chief U.S. negotiator on the framework agreement for dismantling North Korea's nascent nuclear weapons program explained that one of the chief reasons that "so few nations went nuclear was that it was extremely difficult to manufacture the fissile material –enriched uranium or plutonium- required to make a bomb."Jack Kelly, "Arms Expert warns U.S. cities face nuclear terrorism threat". Post-Gazette, 23 January 1999.

www.post-gazette.com/headlines/19990123gallucci3.asp

States expended to create the infrastructure needed to obtain their original nuclear weapons during World War II.

Under the guidance of Dr. Robert Oppenheimer, General Leslie Groves and numerous others, the United States Manhattan Project spent 2 billion dollars to perfect the research, construct the infrastructure and finally build an atomic bomb[52]. Years later, during his first visit to the Los Alamos site in 1943, Dr. Nils Bohr, representing the British side of the bi-national effort, after having been shown the immense complexes which had been built in Oak Ridge Tennessee, Hanford Washington as well as at Los Alamos told Dr. Edward Teller "You see, I told you it couldn't be done without turning the whole country into a factory. You have just done that."[53]

According to a report by the Brookings Institute the cost to reproduce the Manhattan Project in 1996 all told would have been $20 billion dollars. For this expenditure the United States produced four devices at a cost of about $5 billion dollars each: On fission bomb, "Little Boy" used over Hiroshima, and three fusion bombs, the first fusion bomb was used as the test shot in the New Mexican desert to test the fusion design, the second, "Fat Man" was used over Nagasaki and the third "Bomb No. 4", never had to be used.

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[52] Richard Rhodes, The Making of The Atomic Bomb, (New York:, Simon & Schuster, 1986), 638.

[53] Rhodes, 500.

The table reproduced below, from the Brookings Institute website entitled "The Costs of the Manhattan Project"[54] graphically illustrate the costs that had to be paid by the United States in 1945 and what it would have cost in 1996.

Table 1 Manhattan Project Costs

Site/Project	1945 Dollars	1996 Dollars
OAK RIDGE (Total)	$1,188,352,000	$13,565,662,000
—K-25 Gaseous Diffusion Plant	$512,166,000	$5,846,644,000
—Y-12 Electromagnetic Plant	$477,631,000	$5,452,409,000
—Clinton Engineer Works, HQ and central utilities	$155,951,000	$1,780,263,000
—Clinton Laboratories	$26,932,000	$307,443,000
—S-50 Thermal Diffusion Plant	$15,672,000	$178,904,000
HANFORD ENGINEER WORKS	$390,124,000	$4,453,470,000
SPECIAL OPERATING MATERIALS	$103,369,000	$1,180,011,000
LOS ALAMOS PROJECT	$74,055,000	$845,377,000
RESEARCH AND DEVELOPMENT	$69,681,000	$795,445,000
GOVERNMENT OVERHEAD	$37,255,000	$425,285,000
HEAVY WATER PLANTS	$26,768,000	$305,571,000
Grand Total	$1,889,604,000	$21,570,821,000

Therefore, the financial and physical resources and labor required in this gargantuan effort seemed to assure us that for most other states of the world, the dream of a nuclear capability would remain just that - a dream. But as we found out later, espionage and theft have an insidious way of making such dreams come true.

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[54] Brookings Institute Report, "The Costs of the Manhattan Project", The U.S. Nuclear Weapons Cost Study Project.

http://www.brook.edu/FP/PROJECTS/NUCWCOST/MANHATTN.HTM

The technical expertise, industrial capabilities required and huge financial sums demanded for an independent bomb-making industry as shown in Table 1 were always accepted as being beyond the financial reach and internal industrial and scientific capability of most states in general and terrorist groups in particular. This belief has naturally led to the assumption by most people in the United States, that the future potential for these same people to threaten our population with a nuclear device also remains beyond their capability for exactly the same reasons. [55] But I will argue that, in fact, this pernicious assumption is far from the truth. The ability, expertise, and capability to covertly construct and employ a terrorist nuclear device is, in fact, well within the reach of a determined group or state and the only stumbling block keeping such people from achieving their nuclear goal is their inability to obtain a useable amount of fissile material.

The long-standing financial barricade to the development of nuclear weapons has been in place since the creation of the first atomic bomb. This is primarily due to the fact that the useable fissile material created in the vast industrial complexes of the United States, and the other nuclear powers, was "gram for gram far more valuable than diamonds[56]". States which possessed the capability to create the fissile material necessary to make a bomb recognized, at least at the beginning of their efforts that "no essence was ever expressed more expensively from the substances of the world, with the possible exception of the human soul[57]."

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[55] Dr. Nils Bohr commented on this same belief in 1945 when he said that the only way to build the infrastructure necessary to create the fissile material needed to make a bomb would be to turn the whole country into a giant laboratory. Rhodes, 500, This belief that nuclear capability was far beyond the average man was also reflected in the lack of regulations published to prevent the production of fissile materials. See the Readers Digest, March 1999, 87, version of Ken Silverstein "Tales of the Radioactive Boy Scout", Harpers Magazine, November, 1998.

[56] Rhodes, 602.

[57] Rhodes, 554.

WEAPONIZATION OF FISSILE MATERIAL

But once a group or state does comes into possession of an adequate amount of fissile material either through painstaking and expensive research and processing or simply by purchasing a stolen quantity, turning it into a useable, albeit crude, nuclear device, (the process of weaponization) is well within the capabilities of most physics graduate students who have access to a basic machine shop.

Luis Alvarez, one of the physicists for the Manhattan project was quoted as saying "with modern weapons-grade uranium, the background neutron rate is so low that terrorists, if they had such material, would have a good chance of setting off a high-yield explosion simply by dropping one half of the material onto the other half. Most people seem unaware that if separated U-235 is at hand it's a trivial job to set off a nuclear explosion...even a high school kid could make a bomb in short order."[58]

THE URANIUM-GUN BOMB

The most basic bomb design and the design that would most likely be adopted by a terrorist group is that which was used by the United States for their very first atomic bomb "Little-Boy". This design, known as a uranium-gun bomb, is widely published in the open press and is so simple that it requires absolutely no live testing whatsoever. A basic terrorist improvised nuclear device (IND) using the uranium-gun design would need as little as 12.3 kilograms of HEU to produce an explosive force of about 10 to 20 kilotons of TNT. Some estimates such as those conducted by research teams at the University of California claim that a workable IND could be constructed that would yield an explosive force half that of the Hiroshima bomb using only five kilograms of HEU[59]

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[58] Quoted in "Aren't Nuclear Weapons Too Complex To be Built By Terrorist Groups?" Nuclear Control Institute, Washington DC.

http://www.nci.org/heuib1.htm

[59] Nuclear Control Institute, Washington DC, http://www.nci.org/heuib1.htm.

Both the United States and the Soviet Union developed and deployed various types of weapons using uranium-gun technology similar to the design shown in the Little-Boy bomb example below. This was also the type developed by both South Africa and Israel.

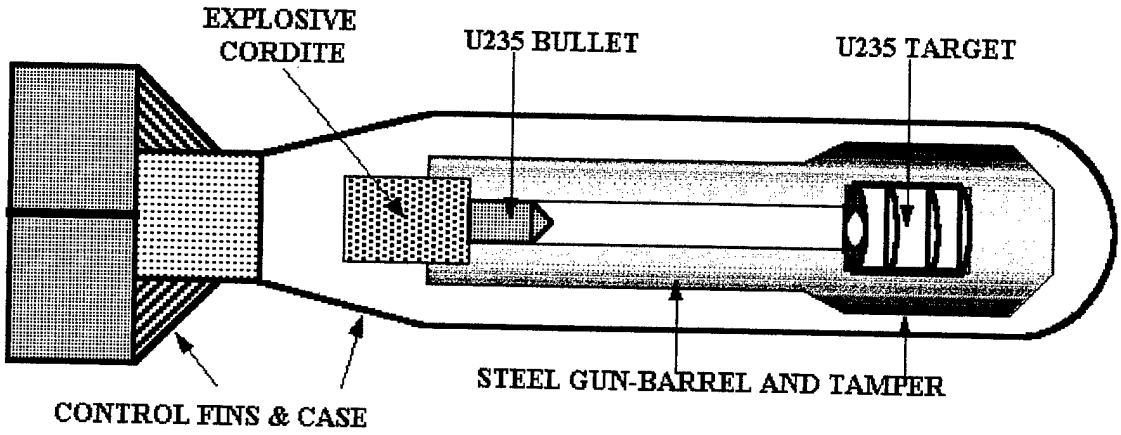
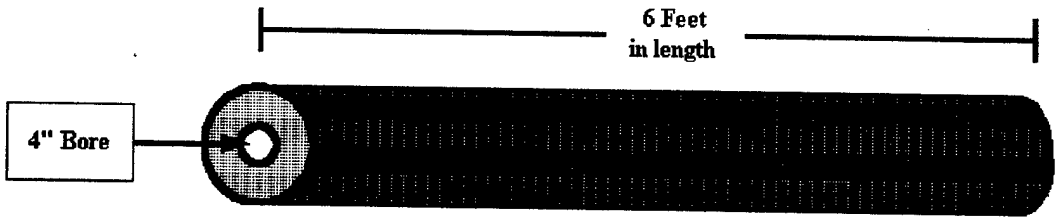


Figure 8 Little Boy Uranium-Gun Bomb

The "Little-Boy" bomb was constructed and the components loaded on-board the USS Indianapolis for it's cross-Pacific voyage to the island of Tinian and it's final destination – The bomb bay compartment of the Enola Gay, a B-29 bomber of the 509th Bomb squadron.

Figures 9 through 11 detail the basic components that could be used to construct a uranium gun bomb based on the Little Boy design and were developed using various sources. In addition the basic physics involved in a fission bomb can also be found on the Internet at www.milnet.com/milnet/nuc-gun.htm.

The uranium-gun bomb design of "Little-Boy" was basically a gun barrel section, or pipe with fins at one end for stabilization and altitude measurement during it's fall, and a rounded nose at the other end to make it aerodynamic. One crew member of the Enola Gay thought it looked like "an elongated trash can with fins"[60]



Gun Barrel Assembly (steel bar stock either cylindrical or square with a 4 inch diameter bore, threaded at both ends)

Figure 9 Gun Barrel Assembly

[60] Rhodes, 701.

At one end of the barrel assembly is the target assembly where several donuts of 80% enriched Uranium-235 were welded together. The donuts of U-235 were supported and backed by steel tamper around their sides and back to encase the explosion long enough to reach it's maximum potential.

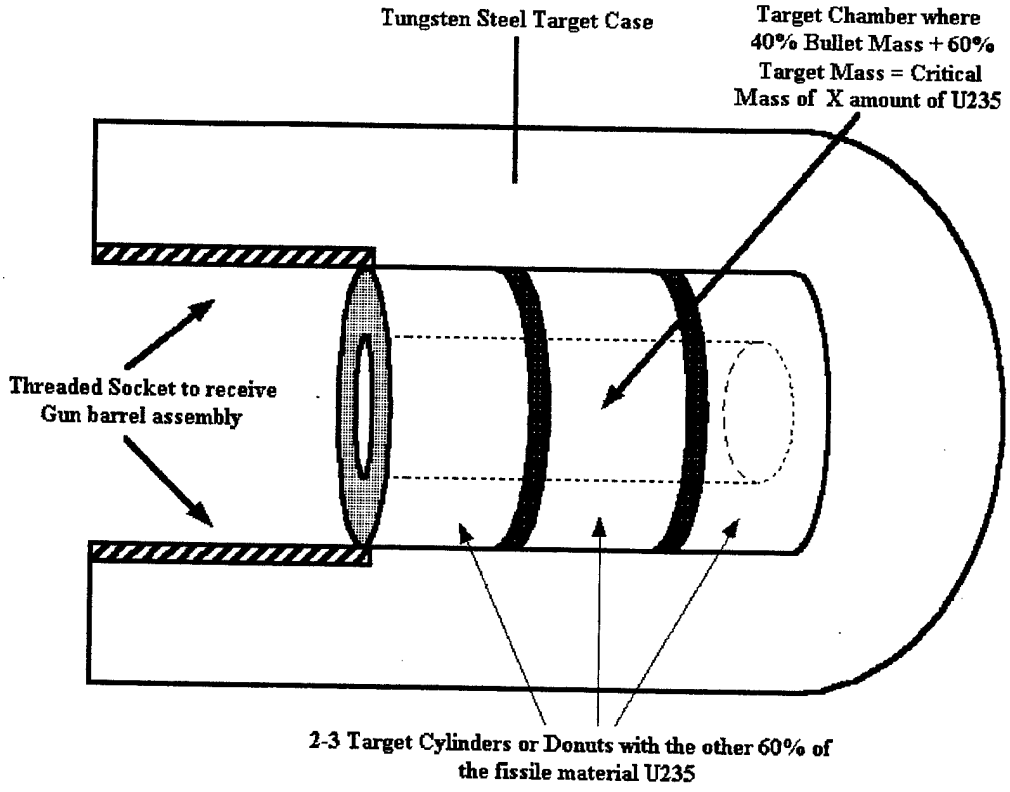


Figure 10 Target Assembly

At the other end was another mass of enriched uranium in the shape of a plug that would fit perfectly into the donut hole of the target cylinder at the other end. The plug of U-235 would be shot into the donut hole by the detonation of Cordite (a basic explosive) which was packed behind the plug like the powder behind a bullet.

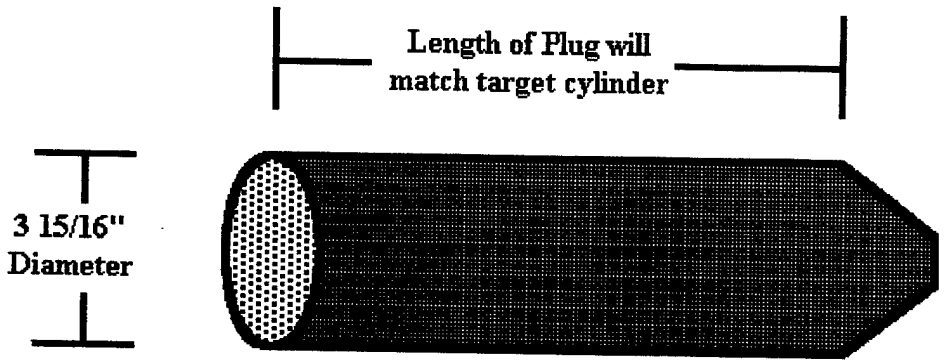


Figure 11 Projectile

The triggering device for the "Little-Boy" uranium-gun bomb was a simple primer cap inserted into the cordite like a blasting cap in a stick of dynamite, and was attached to an altimeter in the tailfin assembly of the bomb. When the bomb reached a preset altitude, the primer was fired and the cordite ignited forcing the plug of U-235 down the gun barrel at high speed. The rapid joining of both components into one mass at the end of the bomb caused the 92.6 lb. of U-235 to reach it's "critical mass" and result in a nuclear explosion. The triggering device for a terrorist IND mounted in the back of a rental truck would be much simpler, consisting basically of a blasting cap, method of electronic ignition, a battey source and a timer.

THE BASIC IMPLOSION BOMB

Once the "Little-Boy" bomb was loaded and on it's way to Tinian, the scientists at Los Alamos, having succeeded in constructing a basic atomic bomb, turned their attention to a second bomb design that was more powerful and used the rare fissile material much more efficiently. This implosion design was not as sure as the uranium-gun design and required an actual test to insure it would work. On April 24, 1945 at Trinity, New Mexico, the world's first atomic explosion took place. The implosion design was then used for the "Fat-Man" bomb later dropped on the city of Nagasaki, Japan.

The simple uranium-gun bomb design was used only once for the bombing of Hiroshima, but the simplicity of it's design led it to be the model for all other developing nuclear powers and today lies within the capabilities of any determined terrorist group or rogue state. The simple implosion design of a "Fat-Man" bomb would use less fissile material (about 20 lbs. of plutonium or 40 lbs. of uranium) and would require a fissile "pit" or sphere of material. This "pit" would need to be surrounded on all sides by explosives as shown in figure 12.

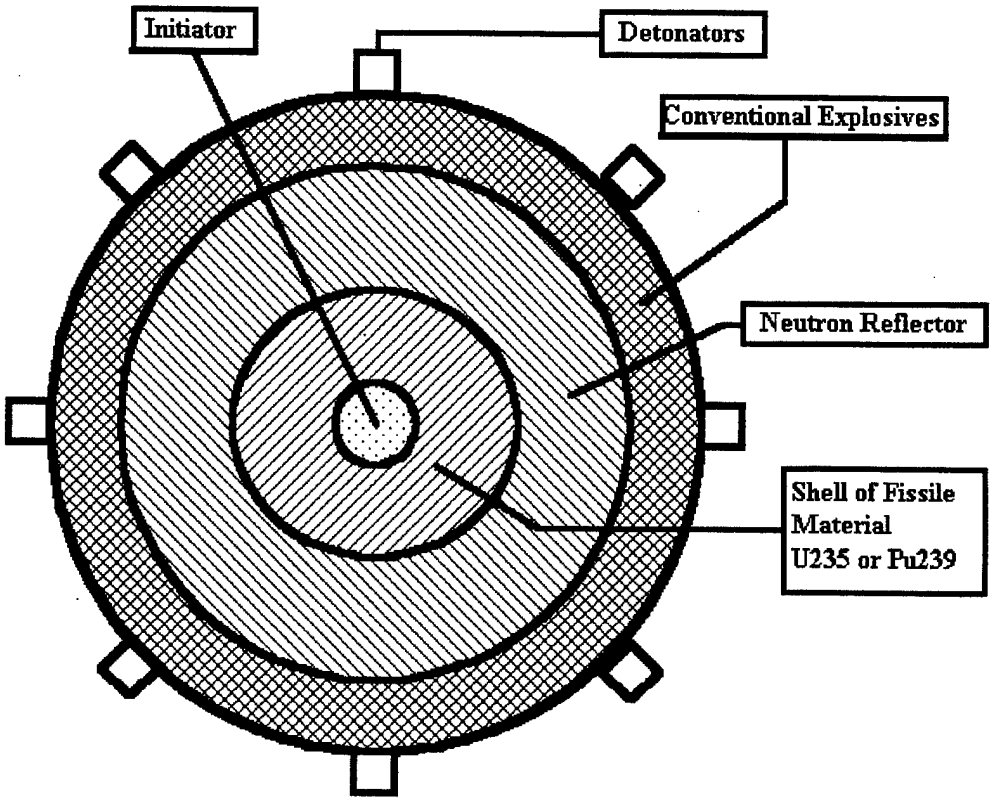


Figure 12 Implosion Assembly

One of the more sinister advantages a terrorist group would gain from using a crude implosion device is the fact that less pure forms of HEU and any isotope of plutonium could be used. Materials such as fuel rods found in the reactor cores of decommissioned nuclear submarines could be used, thus widening the potential supply of fissile material to a rogue state or terrorist group.[61]

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[61] Graham T. Allison, Owen R. Cote, Jr., Richard A. Falkenrath and Steven E. Miller, Avoiding Nuclear Anarchy: Containing the Threat of Loose Russian Nuclear Weapons and Fissile Material, CSIA Studies in International Security No 12, (Cambridge, Massachusetts, The MIT Press 1996) 223, and J. Carson Mark, "Explosive Properties of reactor-grade plutonium", Science & Global Security,(Gordon and Breeach Science Publishers, Switzerland) Vol. 4, No. 1, 1993, 111-128.

A more sophisticated triggering mechanism than the uranium-gun bomb would be needed to ignite the explosive at 15 or so points placed symmetrically around the "pit", all at the same time. The shock wave of the explosion would collapse onto the "pit" causing it to compress and shrink in size and reach critical mass and result in an explosion. The "Fat-Man" implosion design, although more involved, would still be within the capabilities of a determined group and, using 20 lbs. of plutonium, is capable of yielding an explosive force of 22 kilotons[62].

THE DIRTY OR RADIOLOGICAL BOMB

In the event a terrorist group came into possession of a supply of fissile material and was, for reasons of time or lack of materials, unable to fashion one of the two basic bomb types described above, they would still be able to simply pack explosives around three kilograms of fissile material and detonate the entire mass causing it to go super-critical which would result in the dispersal of radioactive contamination over a radius of hundreds of yards contaminating all surrounding areas affected by the blast and all areas down-wind of the blast site. Although the blast radius itself would not be of nuclear yield, the fallout would still be just as deadly[63].

And if a terrorist group could not obtain a supply of fissile material to produce a radiological bomb, they may simply choose to follow in the foot steps of Boy Scout David Hahn, who in 1995, while attempting to satisfy a requirement for the Atomic Energy Merit Badge, created in his mother's back yard garden shed, a large amount of

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[62] Robert Del Tredici, At Work In The Fields Of The Bomb, (New York, Harper and Row, Publishers, 1987), iv.

[63] Nuclear Control Institute, Washington DC, http://www.nci.org/heuib1.htm.

radioactively contaminated materials that were a thousand times more radioactive than normal levels.[64]

This effort by the resourceful scout, who used readily available materials such as lantern mantels (containing thorium-232) , smoke detectors (containing americium-241), antique clocks (containing radium), pitch blend ore (containing small amounts of natural uranium) and a stolen strip of beryllium from his school chemistry lab, eventually produced a radioactive danger to the 40,000 residents around his home in Commerce Township, Michigan and required a sixty-thousand dollar clean-up effort by the Environmental Protection Agency's Super Fund to remove thirty-nine barrels-worth of radioactive materials that had to be trucked to the Great Salt Lake Desert in Utah to be entombed with the rest of America's nuclear waste.

According to Dave Minnaar, radiological expert with Michigan's Department of Environmental Quality and reported in the Reader's Digest, when questioned roughly about how a Boy Scout could do this or have access to such materials, he responded: "These are conditions that regulations never envision. It's simply presumed that the average person wouldn't have the technology or materials required to experiment in these areas."[65]

ROCKET SCIENCE?

As shown by Dave Minnaar's statement above the general belief that a nuclear device or reactor of any type could not be built by anyone other than those with the required technological background was well accepted, at least by the governmental

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[64] For the complete story of David Hahn's efforts see "The do-it-yourself reactor", The Bulletin of the Atomic Scientists, Vol. 55, No. 1, January/February 1999, Ken Silverstein, "Tale of the Radioactive Boy Scout", Harpers Magazine, November, 1998, and the Reader's Digest version of Mr. Silverstein's report in the March 1999 issue.

[65] Ken Silverstein, from Harper's Magazine, "Tale of the Radioactive Boy Scout", Reader's Digest, March 1999, 92.

authorities in Michigan (and I would venture to guess in other states as well), and consequently regulations which could have focused on such a potentiality were never considered as necessary. But, indeed, as this story proves, even a Boy Scout had the ability to acquire the knowledge necessary and the capability required to produce the heart of what could have been, in the wrong hands, the third of the crude nuclear WMD - a radiological bomb.

But what of the ability to create a fission bomb such as the crude uranium-gun bomb described earlier? In their book *Avoiding Nuclear Anarchy: Containing the Threat of Loose Russian Nuclear Weapons and Fissile Material*, the authors, Graham T. Allison, Owen R. Cote, Jr., Richard A. Falkenrath and Steven E. Miller quote John Foster, the former director of the Lawrence Livermore nuclear weapons laboratory who states, "the only difficult thing about making a fission bomb of some sort is the preparation of a supply of fissile material of adequate purity; the design of the bomb itself is relatively easy".[66] The authors also go on to state that "There is a consensus among U.S. weapons designers that most states and many terrorist groups could build a simple nuclear weapon given an adequate supply of fissile material".[67]

Therefore, the belief that building a nuclear device is a complicated and impossible task to all but the most knowledgeable nuclear physicists can be argued as false. And as demonstrated by the statements above, it is clear that a determined group or

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[66] John Foster, "Nuclear Weapons", Encyclopedia Americana, Vol. 20 (New York, NY: The American Corporation 1973), 520-522 in Graham T. Allison, Owen R. Cote, Jr., Richard A. Falkenrath and Steven E. Miller, Avoiding Nuclear Anarchy: Containing the Threat of Loose Russian Nuclear Weapons and Fissile Material, CSIA Studies in International Security No 12, (Cambridge, Massachusetts, The MIT Press 1996) 12.

[67] Graham T. Allison, Owen R. Cote, Jr., Richard A. Falkenrath and Steven E. Miller, Avoiding Nuclear Anarchy: Containing the Threat of Loose Russian Nuclear Weapons and Fissile Material, CSIA Studies in International Security No 12, (Cambridge, Massachusetts, The MIT Press 1996) 12.

state, having obtained an adequate amount of fissile material could indeed build at least one of the three crude nuclear devices described here.

If we can accept this notion, it becomes clear that the only difficult part of making an improvised nuclear device is in fact obtaining a useable amount of weapons-grade fissile material, the amounts of which can be as little as one kilogram which would produce 100 tons of explosive force[68], and therefore the real task of nonproliferation will be to ensure that the massive amounts of fissile material stockpiled by the nuclear successor states of the Soviet Union do not find their way into a nuclear black market.

[68] Nuclear Control Institute, Washington DC, http://www.nci.org/heuib1.htm

CHAPTER 4: THE SPATIAL INTERACTION OF TRADE

In the first and second chapters we saw that there is both a historical trend in terrorist uses of increasingly more powerful weapons and the increasing potential for U.S. interests to be threatened by events which can take place both inside and outside our continental borders. And although much effort continues to be exerted through the agencies of the U.S. federal government to keep the population-at-large safe and secure, the potential threat continues to occupy a corner in the minds of some Americans.

KEPLER'S FAMILIAR EXAMPLE

Predicting whether trade in the illegal smuggling of fissile material from the FSU will develop is a weighty task and requires a rigorous framework suited to the challenge. The complexities involved in evaluating the potentiality of this issue are great and sometimes finding the right answers can be extremely difficult. Sage guidance on how to proceed in such a search was provided many years ago by the great German mathematician Johannes Kepler who, in 1611, said "To arrive at a clear decision on these questions, let us take familiar examples, but set them out in geometrical fashion."[69]

Therefore, heeding the advice of Dr. Kepler, the "familiar example" I will use to arrive at a clearer understanding of the potential for the development of an illegal trade in fissile material is the system of analysis presented by Dr. Edward L. Ullman called "Ullman's Triad". Dr. Ullman's system of analysis is a product of his ability to simplify complex economic concepts and break them down to something he could understand well

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[69] Johannes Kepler, "The Six-Cornered Snowflake (1611), quoted in Peter Haggett, GEOGRAPHY: A MODERN SYNTHESIS, (New York, Harper and Row, Publishers, 1972) 323.

and then use when speaking with both students and politicians.[70] His search for a system[71] that would address "Spatial Interaction" led him to develop his own theory which he called "Ullman's Triad". This theory would serve two purposes: It would show why trade flows occur and show why spatial interaction between two separate regions could occur[72]; And the theory could be used to predict or understand potential new interaction under changed conditions.[73]

ULLMAN'S TRIAD

Ullman's Triad was a framework around which Dr. Ullman was able to gauge whether trade in a particular commodity between two groups could and would occur by observing the interactions which surrounded the three factors he saw as required for that trade to occur:

- Complementarity, which consisted of supply and demand

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[70] Professor Gunter Krumme, University of Washington, interview by author, 10 February, 1999, Smith Hall, Department of Geography, University of Washington.

[71] According to Dr. Ullman, there had only been a few works previously written on the concept of situation/spatial interaction and these gave few clues for making the concept operational or how to measure or predict spatial interaction (H. J. Mackinder's "The Physical Basis of Political Geography" in 1886; J. R. Whitaker's "Regional Interdependence" in 1932; P. R. Crowe's "On Progress in Geography" in 1938; And R. S. Platt's Reconnaissance in Dynamic Regional Geography: Tierra del Fuego" and Pierre Gourou's "Civilisations et malchance geographique", both in 1949). It was for this reason that he submitted his system to measure and predict spatial interaction in 1953. According to Ullman, the reason why spatial interaction had been largely ignored was summed-up by Richard Hartshorne in his 1939 paper "The Nature of Geography" when he said "it is because it is inconvenient in a regional treatment constantly to leave a region and move out of it." Edward L. Ullman, Geography as Spatial Interaction, (Seattle, University of Washington Press, 1980) 13-15

[72] Edward L. Ullman, Geography as Spatial Interaction, (Seattle, University of Washington Press, 1980) 15

[73] Edward L. Ullman, Geography as Spatial Interaction, (Seattle, University of Washington Press, 1980) 20

- Lack of an intervening opportunity
- Transferability

This framework allowed him to examine the spatial interactions between the group with the supply of a particular commodity and the group with the demand for that commodity as well as the effects of both transportation costs on moving the commodity from one to another, and the derailing effect of a new supplier entering into the equation. He believed that if any of the spatial interactions surrounding the three factors of trade were absent or altered, trade between the two original entities in that particular commodity would not occur. Dr. Ullman believed that his Triad's simple but rigorous framework for examining the interactions which occur among the three factors of trade would "cover any case of material interaction of goods or people."[74]

At this point it is prudent to provide a definition of "Spatial Interaction" as given by Dr. Ullman:

> "Perhaps the essential intellectual contribution of human geography can be summarized by the concepts of site and situation. Site refers to local, underlying areal conditions and leads to defining geography as the study of the "relations between man and the environment." Situation refers to the effects of one area, or rather phenomena in one area, on another area. It should logically focus on the connections between areas and leads to such terms as "circulation" and "regional interdependence" or to specific aspects such as "diffusion" or

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[74] Edward L. Ullman, Geography as Spatial Interaction, (Seattle, University of Washington Press, 1980) 19.

centralization." This situational concept is defined here as "spatial interaction."[75]

Spatial interaction can therefore best be understood as encompassing all that occurs in both the horizontal and the vertical relationships of man to Earth. As Ullman pointed out site can be conceived of as a "vertical relationship", for example the relationship between the soil below and the crop that grows above it. Situation can be conceived of as a "horizontal relationship" such as the trade interactions that occur between regions and their markets to which that crop will be transported.

The best way to demonstrate the mechanics of Ullman's Triad is through demonstration using two imaginary towns involved in a potential trading scenario. One will be the heavily forested area which I will call Woodtown and the second will be the heavily populated and industrial steel-producing Steeltown. My task will be to apply Ullman's Triad to determine if trade in the finished lumber products of Woodtown will occur between Woodtown and Steeltown.

COMPLEMENTARITY

The first step will be to determine if there is complementarity between the two towns, meaning that in one specific place there is a supply of a commodity and in the other specific place there is a corresponding demand for that same commodity. The concept of complementarity, which was borrowed from the Swedish economist Bertil Ohlin[76] and which also has its basis in international trade theory[77], stated that for

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[75] Edward L. Ullman, Geography as Spatial Interaction, (Seattle, University of Washington Press, 1980) 13.

[76] Bertil Ohlin, Interregional and International Trade, (Cambridge, Mass., Harvard University Press, 1933) as mentioned in James O. Wheeler and Peter O. Muller, Economic Geography, (New York, John Wiley & Sons, 1981) 74.

[77] Professor Krumme interview, 10 February, 1999.

complementarity to be present there had to be a supply of a commodity in one region and a demand for it in another.

The simple existence of a surplus supply of a commodity would not automatically lead to trade in that commodity unless a buyer could be found. Until that demand could be found, the commodity would remain temporarily without value. For example, "The rich petroleum of the Middle East lay untapped for millennia, until demand arose following particular technological developments."[78] Therefore there can be no complementarity if one of these two factors is absent.

Woodtown, as described above is situated in a heavily forested area and their years of work has provided them with a good surplus supply of finished lumber products

The steel-making business in Steeltown is booming and the potential for even greater profits has prompted the steel mill to begin expanding operations. In addition a new glass factory has been built. All of this will require a larger workforce and so the recruiting process for additional workers across the board has increased dramatically.

The influx of new workers has led to a great demand for low cost housing. Currently, wood-frame housing is the cheapest and easiest to construct, but the supply of finished lumber products in Steeltown has been exhausted. So we can see that there is a demand for finished lumber products to build houses in Steeltown. This demand can be met by the supply of finished lumber products present in Woodtown.

Therefore we can state that perfect complementarity exists between the two towns since we have a demand for a particular commodity (finished lumber products) in Steeltown and a ready supply of that same commodity in Woodtown.

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[78] James O. Wheeler and Peter O. Muller, Economic Geography, (New York, John Wiley & Sons, 1981) 74.

TRANSFERABILITY

The second step will be to determine if the commodity can be transported economically from the specific location of supply to the specific location of demand. This is the concept of Transferability. Is the one with the demand willing to pay the price being asked by the one with the supply? And can the one with the supply deliver at the asking price?

The demand to house the incoming new workers in Steeltown is great and the owners of both the steel mill and the glass factory have agreed to pay the owners of the lumber mill a large amount of money for finished lumber if it can be delivered to Steeltown. The lumber mill owners have examined and calculated that the costs and risks of building and maintaining a rail line from their mountainous region to transport the lumber down to the plains where Steeltown is located will be more than covered by the increased profits they will receive for their surplus lumber. [79]

As shown in the example, Transferability is one of the key concepts in Ullman's Triad. The ability to transport a resource such as the finished lumber in our example, from a location where it is surplus, to a second location where there is a demand for that same, unchanged resource will succeed in increasing its value. The ability to transport the resource is solely dependent on the technological capabilities and willingness of one or both parties to overcome the various obstacles that may stand between the supply and the demand.

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[79] The costs of construction of a transportation link between the two towns could also have been borne by the business owners of Steeltown who could have then bought the lumber at the surplus price up on the mountain, or the cost of establishing the transportation link could have been borne between the two or even by a third, independent entity who would have bought the lumber at a low price and sold it in Steeltown for a higher price and used some of the profit to defray the construction and operational costs or the railroad, or any combination of the three.

As authors James O. Wheeler and Peter O. Muller point-out in their book Economic Geography, "Without transportation, the resource has only very local and limited utility; the availability of the resource as a result of its movement adds the place utility." But an important factor to remember is that "although complementarity may exist between two points, transferability problems may be so great that no interaction will take place" [80]. Dr. Ullman explained the importance of transferability and how it relates to the concept of trade interaction between two entities, in this way: "If the distance between market and supply were too great and too costly to overcome, interaction will not take place in spite of perfect complementarity and lack of intervening opportunity. Alternate goods would be substituted where possible."[81]

This could be the case with our example, lets imagine that the physical distances between Woodtown and Steeltown are indeed great, and the risks and costs involved in the railroad's construction and maintenance could prove to be too high. We can imagine how the potential profits that would be gained from the higher selling price of the finished lumber products could easily be swallowed-up completely in high railroad construction and maintenance costs. Such an undertaking would not be economically viable and so the lumber mill owners would forgo this potential trade opportunity.

In this situation, despite perfect complementarity, the obstacles to transferability were too great, therefore since one of the factors of Ullman's Triad had not been achieved, we could state categorically that trade in finished lumber products between Woodtown and Steeltown would not occur.

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[80] James O. Wheeler and Peter O. Muller, Economic Geography, (New York, John Wiley & Sons, 1981) 75.

[81] William L. Thomas, Jr., Ed. ,Man's Role in Changing the Face of the Earth, (Chicago, The University of Chicago Press, 1956) 868.

So we can see that despite the fact that finished wood products could not be transferred economically to Steeltown, the builders in Steeltown would still have their demand for housing and would therefore have to resort to alternate goods to meet that demand, perhaps using cheaper locally produced steel and glass to build steel-frame housing or even apartment buildings of steel and glass to house their much needed workers.

But the physical distances and rough terrain obstacles that separate Woodtown and Steeltown are only one example of the many and various obstacles that can keep trade between two regions from occurring. These obstacles can also take on many forms. According to Wheeler and Muller:

> "Although shipping time and cost are the major constraints, political barriers may reduce or eliminate trade. The quality of the transport route, the degree of congestion, the ruggedness of the terrain, and the level of technology are other factors which may retard interaction. Places are not equally linked with one another for a number of fairly obvious reasons."[82]

LACK OF AN INTERVENING OPPORTUNITY

The third and final factor which must be present to insure trade will occur between a specific location with a demand and a specific location with a supply is that there can be no other location which could meet the demand for that same commodity. The idea of intervening opportunity, first put forth by Samuel A. Stouffer in his article "Interviewing Opportunities: A Theory Relating Mobility and Distances"[83], dealt with

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[82] James O. Wheeler and Peter O. Muller, Economic Geography, (New York, John Wiley & Sons, 1981) 75.

[83] Samuel A. Stouffer, "Intervening Opportunities: A Theory Relating Mobility to Distances", American Sociological Review, No. 15 1940, 845-67, as quoted in Edward

migration patterns and stated that "the number of persons going a given distance [from X to Y] is directly proportional to the number of opportunities at that distance [Y] and inversely proportional to the number of intervening opportunities between origin [X] and destination [Y]"[84]. Ullman saw the applicability of this concept and incorporated it into his theory of trade.

Returning back to our original situation between Woodtown and Steeltown, if the construction companies of Steeltown are approached by the owners of a different lumber company from the town of Greentown and if the Greentown lumber company offers to intervene with the exact same type of finished lumber products at a price lower than the folks up in Woodtown, then Steeltown will naturally go with the opportunity presented to them by the folks from Greentown.

In this case, again one of the factors of Ullman's Triad was not met (Lack of an Intervening Opportunity). There *was* an intervening opportunity presented by Greentown, therefore we can again state that trade between Steeltown and Woodtown in finished lumber products will not occur.

So we have seen through this example how the framework of Ullman's Triad has given us three bases from which to evaluate the potential for trade to occur between two specific locations:

- if there is a demand for a commodity in one location,
- and if there is a supply of that commodity in a second location,

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L. Ullman, Geography as Spatial Interaction, (Seattle, University of Washington Press, 1980) 16.

[84] James O. Wheeler and Peter O. Muller, Economic Geography, (New York, John Wiley & Sons, 1981) 77.

- and if that commodity can be transferred from the location of supply to the location of demand,

- and no other supplier intervenes...

then we can categorically state that trade in that particular commodity between these two specific locations will occur.

THE RATIONAL FOR USING ULLMAN'S TRIAD

Unfortunately Ullman's Triad has been viewed by some as self-evident facts of daily business practice[85] since all three of the of the components are accepted as givens and already present and able to be addressed individually in other frameworks. For example the concept of Intervening Opportunity has already been addressed in terms of competitive advantage, pricing structures and volumes have been written on Supply and Demand[86]. The framework of Ullman's Triad is so fundamental and accepted that it has never really been applied in the literature. Some text books which focus on economic geography give the concept a line or two and move on[87] But the value of using the rigorous and accepted framework of Ullman's Triad to address trade components comes when we begin to discuss and look at the potential for illicit trade.

According to Dr. Ullman, this system of analysis, developed to study the transfer of physical goods (as well as passengers) could be used when "attempting to explain past interactions or in predicting potential interaction when underlying conditions change[88]." The opportunity to enhance and refine his Triad was foreseen by Dr. Ullman when he wrote:

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[85] The economic roots of Ullman's Triad, according to Professor Gunther Krumme of the Geography Department of the University of Washington and a former student of Dr. Ullman, can be found in both International Trade Theory and Migration Theory Professor Krumme interview, 10 February, 1999.

[86] For an presentation of these concepts see Edward J. Taaffe, Howard L. Gauthier and Morton E. O'Kelly, Geography of Transportation, (New Jersey, Prentice Hall, 1996).

[87] See Richard S. Thoman and Peter B Corbin, The Geography of Economic Activity, (New York, McGraw-Hill Book Company,1974) 179.

[88] Edward L. Ullman, Geography as Spatial Interaction, (Seattle, University of Washington Press, 1980) 20.

> "This paper has attempted to provide the beginnings of a system explaining the basis of spatial interaction, a system based on complementarity, intervening opportunity, and distance. Perhaps route might be a fourth factor, although it is largely subsumed under distance. Additional generalizations and hypotheses covering important subsystems or topics have also been attempted...Undoubtedly many of the generalizations can be refined and some maybe superseded by others. Still other new ones await discovery and development."[89]

Dr. Ullman understood that the concepts he was presenting were not new and stated so himself: "The purpose ... therefore has been to try to make explicit that which has only been implicit in most geographical writing. The concept, like everything else, is not new. Focusing research on interaction may well provide a fruitful avenue of advance for many disciplines."[90]

It is therefore this same obviousness and familiarity that allows Ullman's Triad to serve us so well as Kepler's recommended "familiar example" because by applying the components of this "familiar example" to the question of trade in fissile material, Ullman's Triad can be used to present a logical argument that is irrefutable. Ullman's Triad can provide a rigorous format for addressing the problem of illicit fissile material trade by allowing us to examine in more detail, the components and details that make-up the different components that, unlike legal trade, cannot be taken at face value as fundamental.

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[89] Edward L. Ullman, Geography as Spatial Interaction, (Seattle, University of Washington Press, 1980) 26.

[90] Ullman, 27.

Therefore, I plan to use Ullman's Triad as my familiar example to look at the situation concerning the potential for the development of trade in fissile material in the same way that we looked at the potential for trade in finished lumber products, and focus my efforts on the interactions between the potential suppliers of fissile material and the potential buyers to "predict or understand potential new interactions [with regard to fissile material] under the changed conditions"[91] which were brought about by the collapse of the FSU. I believe that when we apply Ullman's fundamental theory of trade to the problem at hand we can better understand that if the end-state conditions of Ullman's Triad are met, trade can and will occur, in any product, legal or illegal, whether that product is lumber for building houses and traded between Woodtown and Steeltown as described in the example above, or fissile material for building a nuclear device that is traded between organized crime elements of the FSU and a terrorist group.

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[91] Edward L. Ullman, Geography as Spatial Interaction, (Seattle, University of Washington Press, 1980) 20.

CHAPTER 5: THE DEMAND FOR FISSILE MATERIAL, NUCLEAR WEAPONS AND THE SPECTER OF NUCLEAR PROLIFERATION

The demand by legitimate states for nuclear weapons, has, up to this point, been assuaged in large part by the promises and commitments to disarmament and non-proliferation that were agreed to in the Nuclear Non-Proliferation Treaty (NPT) of the late 1960s.

At that time, there had been only five states (United States, Soviet Union, Britain, France and China) that had openly integrated nuclear weapons into their military arsenals and doctrine. These five states, referred to as overt nuclear weapon states, and the 173 non-nuclear states each made a pledge: the non-nuclear states made the political decision to eschew nuclear weapons and pledged to forgo pursuing the nuclear option. The nuclear states agreed to enter into agreements which would end the nuclear arms race and would result in significant reductions with the end result being their total elimination.

During this period in history, the specter of nuclear proliferation was real. The NPT was negotiated under a sword of Damocles that threatened a vision of 50 to 70 overt nuclear states by the turn of the century. The threat of nuclear war without the NPT would have been frightfully more real and imminent than the horror of the Cold War. The population would have lived day to day uncertain of whether human civilization was indeed on the brink of extinction.

Prior to the start of NPT negotiations, Sweden had, for years, been developing its nuclear weapons program while Switzerland had already twice voted in national referendum to begin development of nuclear weapons[92]. And, according to an interview

[92] The first Swiss vote authorizing the production, import, transit, storage and usage of nuclear weapons was conducted on 1 April, 1962 with 537,138 of the population voting yes and 286,895 voting against. The second vote for nuclear weapons was passed on 26

at the University of Washington with Ambassador Thomas Graham, Jr., former Special Representative of the President for Arms Control, Non-proliferation, and Disarmament under President Clinton, "Germany could have had a nuclear weapon [snapping his fingers] like that, as could Japan."[93]

Although the NPT was the law of the land, there were failures. South Africa and Israel worked closely together to develop and build a covert nuclear arsenal and India detonated a nuclear weapon in 1974, but then quickly claimed it had been a "peaceful nuclear explosion."

Overall, during the thirty years that the NPT reigned supreme, no new overt nuclear weapon states strode onto the world stage, and the delicate balance of nuclear terror between the Soviet Union and the United States was maintained. The world was spared from nuclear holocaust, but as Ambassador Graham pointed out, "we were very lucky".[94]

FACTORS WHICH MAY CONTRIBUTE TO AN INCREASED DEMAND BY NON-NUCLEAR STATES FOR NUCLEAR WEAPONS.

Today, it is a fact that the reduction of intermediate and long range nuclear weapons is underway and proceeding according to the commitments made by the two superpowers as part of both the Intermediate Range Nuclear Forces (INF) treaty and the Strategic Arms Limitation Talks (SALT).

May, 1963. Despite numerous reservations Switzerland later signed the Non-Proliferation Treaty on the 27th of November, 1969. As reported in Chronik der Schweiz, (Chronik Verlag, Dortmund, Germany and Ex Libris Verlag, Zurich, Switzerland, 1987), 577, 578 , 585.

[93] Ambassador Thomas Graham, Jr., President of the Lawyers Alliance For World Security (LAWS), interviewed by author, 21 January, 1999, Seattle, tape recording, University of Washington, Seattle.

[94] Ambassador Thomas Graham, Jr., Interview, 21 January, 1999.

With the implementation of the first Strategic Arms Limitation Talks (SALT I) in July of 1991, which called for a 30% reduction in strategic nuclear weapons for both the US and Soviet Union, both states finally began meeting the weapons reduction pledges called for by the NPT back in 1968.

Then came the INF treaty, signed in December of 1987 by then-president Ronald Regan and then-Soviet General Secretary Michael Gorbachov prohibited both the Soviet Union and the United States from further development and fielding of nuclear missiles that were designed to be used to attack targets that were located 500-5500 kilometers from their launch point. The signing of the INF treaty was a major success for Secretary Gorbachov because allied intermediate range weapons posed a serious tactical and political threat to the Soviet Union and could have served to escalate any conflict between the US and the USSR. By 1992, in compliance with the INF and Short-Range Nuclear Forces (SNF) treaties the United States had removed the last of their tactical nuclear weapons from Europe[95].

The START II treaty, which promised to reduce the threat of nuclear war by limiting the number of strategic nuclear weapons on both sides to around 3500, although signed by both parties in January of 1993, still remains unratified by both the United States Senate and the Russian Duma. This treaty, which was scheduled to be ratified by the Duma on December 18, 1998, was derailed by the U.S. attack on Iraq[96] the day before the November 1998 impeachment vote against President William J. Clinton and now remains in limbo.

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[95] North Atlantic Treaty Organization, NATO Handbook, (NATO Office of Information and Press, Brussels, 1995) 81.

[96] Ambassador Thomas Graham, Jr., Interview, 21 January, 1999.

START III, which is conditional on the ratification of START II and requires an effective "intrusive verification system" a transparency which the Russians have never agreed to[97], could bring the number of strategic nuclear weapons down to 2500.

Despite the derailing of the SALT II Treaty in the Duma, the Russian government seems to need to move faster than the ratification process and recently, according to an article by Stansfield Turner, former director of Central Intelligence, in the *Seattle Post-Intelligencer* published on 3 November 1998, the deputy prime minister of Russia made a statement to the effect that "by another 10 years Russia will not be able to afford to maintain more than a few hundred nuclear warheads." This coincides with information provided by Ambassador Graham who stated that, for economic reasons, by the year 2012 [the Russians] must be down to 500 strategic weapons, which will be the maximum number they can afford to maintain[98].

All of these efforts would seem to herald an overall move towards a reduction in nuclear weapons and would seem to indicate that the demand for nuclear weapons in general should be decreasing. But this may not be the case. In fact, the National Defense University's *Strategic Assessment* for 1995 stated that "The demand for nuclear weapons is growing."[99]

This trend, which demonstrates an increase in the demand for nuclear weapons, is most likely due to the simple fact that nuclear weapons have political rather than military value for a state. They are seen by countries as status symbols, as a way to obtain a higher stature in the eyes of their peers and the world. The desire to be a nuclear state is a political issue. Ambassador Graham framed the argument this way: "It's almost a civil

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[97] Ambassador Thomas Graham, Jr., Interview, 21 January, 1999.

[98] Ambassador Thomas Graham, Jr., Interview, 21 January, 1999.

[99] National Defense University Institute for National Strategic Studies, Strategic Assessment 1995 U.S. Security Challenges in Transition, (Fort Lesley J. McNair, Washington DC, 1995). http://www.ndu.edu/inss/sa95/sach0901.html

rights issue. Nuclear weapons have had a very high political status all during the Cold War and they still have it. If nuclear weapons are going to be what distinguishes a first-class state from a second-class state – what that really amounts to is the rest of the world saying we're not gonna ride in the back of the bus forever!"

Despite the reduction efforts by the United States and Russia, it still remains a fact that countries that overtly possess nuclear weapons still enjoy special privileges that non-nuclear states cannot. For example each of the original overt nuclear states also has the right to hold a permanent seat on the United Nations Security Council.[100] Permanent membership also gives the nuclear states the power to wield the right of veto against any issue brought before the council that goes against their perceived interests. The other 10 non-permanent members to the Security Council must be elected by the General Assembly from the UN body for a 2-year term and do not have any such veto authority.

Nuclear weapons do have a very high political value and that idea of value is often vocally expressed by the nuclear states themselves. For example, during nuclear reduction arguments in the British Parliament in November of 1997, the Conservative leader stood up and made a statement attesting to the absolute political value of being a nuclear state. He stated that Britain could not reduce it's Trident nuclear arsenal any further or it would no longer be a respectable nuclear power and will no longer be a permanent member of the security council with the right of veto.[101]

The concept of the political value of possessing nuclear weapons is also drilled home to the non-nuclear states directly. Immediately following the test explosions by India and Pakistan in 1998, the nuclear states met at an emergency meeting in Geneva Switzerland to decide on what course of action should be taken. Germany and Japan, both signatories to the NPT, also wanted to participate and weigh-in on this very critical issue,

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[100] Central Intelligence Agency, The World Fact Book 1995, (Central Intelligence Agency, Washington DC 1995), 517.

[101] Ambassador Thomas Graham, Jr., Interview, 21 January, 1999.

but both states were told they would not be allowed to attend because they did not possess nuclear weapons.[102]

Actions such as the one described above only serve to reinforce this belief in non-nuclear states that possessing nuclear weapons entitles you to the status of a first-class state. This idea of First and Second Class status is alive and well in the hearts and minds of the non-nuclear weapon states. Upon the successful completion of their nuclear tests in May of 1998, the people of India rejoiced in the streets and glorified their new, upgraded status as a country. The Prime Minister of India Atal Behari Vajpayee even announced after the completion of their successful tests that "India is a big country now because it has nuclear weapons."[103] These sentiments are also expressed by Pakistan, which saw its successful underground test as "a symbol of national pride" and commemorated the one year anniversary in May with 18 days of celebration.[104]

During talks on the Comprehensive Test Ban Treaty (CTBT) Ambassador Graham was told explicitly by the Indians that India currently has plans to continue to integrate nuclear weapons into her military arsenal to include land-based missiles and submarines capable of launching nuclear missiles that will patrol the Indian and Pacific oceans. Pakistan will undoubtedly attempt to keep-up in an escalating arms race and one or both may one day demand a permanent seat on the UN Security Council as a declared nuclear weapon power and first-class state, and with what argument will the five current nuclear states use to deny them their right?

Yet during Comprehensive Test Ban Treaty (CTBT) talks with Indian officials after the nuclear tests, Ambassador Graham, also lobbying for a reduction of nuclear weapons and an end to the potential nuclear arms race on the sub-continent presented an

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[102] Ambassador Thomas Graham, Jr., Interview, 21 January, 1999.

[103] Ambassador Thomas Graham, Jr., Interview, 21 January, 1999.

[104] "Pakistan Prides Going Nuke", Army Times, 24 May1999, 3.

idea that called for drastic reductions in the nuclear arsenals of the five nuclear states which ultimately would leave Russia and the United States with 300 nuclear weapons, France, China and Britain each would hold 50 weapons and India and Pakistan would have zero weapons, but could keep their fissile material on their territory, all of which would be subject to International Atomic Energy Agency (IAEA) inspections. The Ambassador did not receive a violent reaction to this suggestion but rather was told by these same officials that the issue was not about the number of nuclear weapons, but rather the new-found status of the country. In fact the Ambassador pointed out that he has had French officials also tell him that "all they care about is being a nuclear weapon state, they don't care how many they have, they don't care what the rules are. All they care about is being a nuclear weapon state".[105]

Another factor which could contribute to the proliferation of nuclear weapons is the fact that the ability of non-nuclear states to produce nuclear weapons increases with each new advance in technology. What once was believed could "never be done unless you turn the [country] into one huge factory".[106] today can be done for much less as demonstrated by the South African nuclear weapons program example described below.

In 1994 during talks in South Africa to obtain support for a permanent extension of the NPT, Ambassador Graham was given a rare opportunity to tour the entire nuclear weapons complex of South Africa, which had only recently become nuclear-free and joined the NPT. The Ambassador related that he was first shown the plant where the HEU was produced. Then he was taken over to ARMSCOR, the South African armaments company and shown the room where the weapons themselves were produced and assembled. According to the Ambassador, the room was twice the size of our interview room at the University faculty club (about 20x20feet) and the South Africans

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[105] Ambassador Thomas Graham, Jr., Interview, 21 January, 1999.

[106] Richard Rhodes, The Making of The Atomic Bomb, (New York:, Simon & Schuster, 1986), 294.

told him to "look around you, nothing has changed [since they had completed building their 6 weapons]" and the Ambassador related that there was "nothing in that room that you wouldn't find in a high school machine shop." The South Africans told him that their entire program never had more than 150 people working on the project and that the government had spent 25 million dollars to produce their 6 weapons. And then the South African officials told him "there's a reason we are showing you all this. And the reason is we want to impress upon you that anybody can do this – it's not difficult. You don't need to have a big infrastructure like Iraq had, anybody can do this."

Again the most difficult aspect of the entire South African program which was conducted jointly with Israel, was the production of the HEU. And although the South Africans produced their own, Ambassador Graham stated that other states could seek out and buy or steal HEU or plutonium from other sources, such as Russia.[107]

The perceived, ever-increasing political value of nuclear weapons is becoming harder and harder to resist by the non-nuclear states, ("[nuclear weapons] will simply be too politically attractive to resist"[108]) and harder to ignore by the nuclear states. And as nuclear weapons become more valuable politically, the materials and technologies to make them also become more valuable and the demand for such items increases proportionally. This demand will seek out a source of supply if such materials cannot be produced domestically and economically.

During the year 2000 the NPT will come up for its first enhanced review process which was agreed to by the member states during NPT negotiations in 1995 which made the original 1968 temporary NPT agreement permanent.

But according to Ambassador Graham, who played a major role in lobbying countries to sign-on to make the NPT permanent, many countries told him on the

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[107] Ambassador Thomas Graham, Jr., Interview, 21 January, 1999.

[108] Ambassador Thomas Graham, Jr., Interview, 21 January, 1999.

sidelines that, although they were not comfortable with a permanent NPT, they could live with it. But what they could not live with was permanent nuclear state status for the five original nuclear states. "And let me tell you, they said, if there isn't progress between now and 2000 [in nuclear weapons reductions], then we are going to reconsider our commitments to the NPT".[109]

Ambassador Graham went on to relate a very telling incident involving "a very, very senior international diplomat" at the 1995 NPT conference who said that "if the nuclear weapon states don't do more soon to reduce their nuclear stockpile then when I retire from the foreign service of my country I'm going to personally lead a campaign to lead Asia out of the NPT!" Ambassador Graham pointed out that this diplomat was speaking "in the heat of the moment, but he did express a deeply held feeling"[110].

Another aspect which could cause non-nuclear states to forgo NPT adherence is a change in the role of nuclear weapons. A nuclear weapon has one accepted core role and that is to deter the use of other nuclear weapons systems. If this singular core role of nuclear weapons is expanded to include deterrence against other weapons systems such as chemical or biological WMDs, then the promised guarantee of the NPT that no nuclear weapon state will ever use or threaten to use a nuclear weapon against a non-nuclear state will no longer be valid and this will deal a serious blow to the NPT itself. For the last 30 years, non-nuclear states who were signatories to the NPT have lived with an explicit guarantee from the five nuclear states that no matter what they did, to include instigating a conventional war against a nuclear state, they would never have nuclear weapons used

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[109] Ambassador Thomas Graham, Jr., Interview, 21 January, 1999.

[110] Ambassador Thomas Graham, Jr., Interview, 21 January, 1999.

against them. Yet today's more volatile WMD environment has caused many to advocate nuclear retaliation as a response to the use of chemical or biological weapons attacks[111].

Furthermore, if a nuclear weapon is ever actually used against a non-nuclear weapon state and NPT signatory, such as a counter-strike to a massed conventional invasion into South Korea by the forces of the North (who is a signature to the NPT) that would strike such a blow to the NPT that Ambassador Graham believes it could never recover. Other non-nuclear states would see the instability of the NPT and countries which had originally voted in 1995 to make the NPT permanent may decide that the NPT and its guarantees are no longer viable.

A final factor which could cause non-nuclear states to forgo adherence to the NPT and begin pursuit of the nuclear option is the fact that the nuclear states have been relatively impotent in halting the sub-continent from going nuclear. When the non-nuclear states signed the NPT they signed on for only five nuclear weapon states, not seven. And these NPT signatories are very upset with the possibility that India and Pakistan may become numbers six and seven. Ambassador Graham, while lobbying for NPT and CTBT met with several senior Japanese government officials who "expressed significant dismay over the lack of response to the Indian and Pakistani tests" and they told Ambassador Graham, "when we signed up to the NPT we signed up for five nuclear weapon states, not seven and let me tell you if there's and eighth and it's North Korea, there will be a ninth and it will be Japan"[112].

Ambassador Graham then stated during our interview that "if there's a ninth there will be a tenth, eleventh and twelfth like that [snapping his fingers] because South Korea,

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[111] National Defense University Institute for National Strategic Studies, Strategic Assessment 1998 Engaging Power for Peace, (Fort Lesley J. McNair, Washington DC, 1998), xiv.

[112] Senior Japanese official speaking with Ambassador Thomas Graham and relayed during interview on 21 January, 1999.

Taiwan and Indonesia will build nuclear weapons, and they are ready to do so quickly.[113]"

In addition to the specter painted by Ambassador Graham of some of today's non-nuclear democracies deciding to go nuclear, there are states that have, in the past intimated a desire to directly influence or become more involved in regional activities more than their borders and the world community currently allow According to Department of Defense studies reviewed by author Michael Klare in his book, *Rogue States And Nuclear Outlaws*, candidate countries that could fit this description in the future include: "China, Egypt, India, Pakistan, South Korea, Taiwan and Turkey"[114]. These states, according to Klare, are not considered rogue states but rather as "emerging regional powers". Klare points out that although many of these states are currently aligned with the United States today, it would not be prudent to assume that these favorable conditions will remain in force indefinitely.

All that will be needed to change this equation is for new leadership or changing political circumstances to take these states to newer and heretofore unanticipated political territory. And the National Defense University's *Strategic Assessment 1995* states that "In several regions, for example the Persian Gulf and Northeast Asia, there appear to be no limits on the ambitions of unstable actors to acquire the most advanced and deadly weapons available, either through internal or external sources. Increasingly, the currency of power for these countries is a WMD capability."[115] If such states decide to pursue the nuclear option they will begin a search to meet their demand.

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[113] Ambassador Thomas Graham, Jr., Interview, 21 January, 1999.

[114] Michael Klare, Rogue States And Nuclear Outlaws[America's Search For A New Foreign Policy], (New York: Hill and Wang, 1995) 133.

[115] NDU, Strategic Assessment 1995 U.S. Security Challenges in Transition. http://www.ndu.edu/inss/sa95/sach0901.html

The final group of non-nuclear states which could develop an overt demand for a WMD, and are of the greatest concern to U.S. security are the so-called rogue states. States such as North Korea, Iran, Iraq, Syria, Libya, Cuba and Serbia[116] who simply refuse to allow their grasp on power to falter and to protect themselves and their oppressive regimes, they are willing to use any means necessary.

We already know that North Korea, Iran and Iraq have covert nuclear weapons programs and that Iran has twice approached it's Muslim neighbor Pakistan requesting assistance for their program.[117] The ability for one of these countrys to obtain a nuclear weapon is dangerously real. For example, we know that in 1994 the Iranian government was activly attempting to purchase a half-ton of highly enriched uranium (U-235), enough to make ten nuclear bombs from a storage site at the Ulba Metallurgical Plant in remote Ust-Kamenogorsk Kazakstan. This nuclear material which had been part of a failed submarine program, was left behind by the Russians and was "the most exposed hoard of nuclear material the United States had ever come across."[118] The news so shocked the administration in Washington, D.C. that a special covert team was immediately flown to Ust-Kamenogorsk to purchase and remove the "hundreds of cans" containing uranium enriched to 90%, "perfect for making bombs". But this project, which was referred to as OPERATION SAPPHIRE, stumbled across more cans than had been previously estimated. There were not 360, but 1,050 canisters of HEU that needed to be removed from Kazakstan. And later that same year, executives from the Babcock and Wilcox, a large chemical and engineering firm had been looking around Semipalatinsk in Kazakstan for materials that could be purchased to support their industry when they came across a shed, unguarded that contained two tons of HEU. They photographed the shed and its contents and reported back to the CIA, "the reaction of the National Security

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[116] NDU, Strategic Assessment 1998 Projecting Power for Peace, 6, 14.

[117] Ambassador Thomas Graham, Jr., Interview, 21 January, 1999.

[118] Andrew and Leslie Cockburn, One Point Safe, (New York, Anchor Books Doubleday, 1997), 145.

Council was: "Jesus Christ!" How much more of this stuff was going to turn up?"[119] These incidents are very significant. During OPERATION SAPPHIRE, one of the American workers helping to extract the HEU from Ulba came across several of these containers packed and ready for shipment. "Each one had an address neatly stenciled on the outside. The writing was Cyrillic, but it was easy to spell out the destination: Teheran, Iran."[120]

Iraq also continues to push for completion of their nuclear weapons program and will probably continue to do so even after a significant leadership change at the top in order to establish the fact that Iraq is a real state and, with nuclear weapons, it could take a place at the table of first-class states. Unlike Iran which has a 2000-year history, Iraq is simply a place on the map peopled by three very different groups: the Kurds in the north, Shiites in the south and Sunnis in the center, and the whole lot was simply cobbled together into a state by the British empire for expediency. Possessing nuclear weapons, however would, in the eyes of the Iraqi leaders, vindicate the existence of an Iraqi state.

The North Koreans, despite warnings to forsake nuclear weapons, continue to work on their covert nuclear program. According to an Associated Press report by Terence Hunt, in November of 1998, U.S. spy planes had photographed a site near a mountainside at Keumjongri where thousands of workers were digging a huge hole. The site, which very well may be related to nuclear testing, is near the nuclear complex at

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[119] For a complete description of OPERATION SAPPHIRE see Andrew and Leslie Cockburn's book One Point Safe, (New York, Anchor Books Doubleday, 1997), Chapter 9.

[120] During press conferences on the success of OPERATION SAPPHIRE, information about the shippment of canisters to Iran, which had contained beryllium, a very critical metal for nuclear weapon construction, was kept from the media and was "instantly and highly classified." According to the authors, the Sapphire team "were warned never to discuss what they had found. It was much too real." Andrew and Leslie Cockburn, One Point Safe, (New York, Anchor Books Doubleday, 1997), 161.

Yongbyon. According to the report, when the U.S. requested permission to inspect the site, the North demanded $300 million to enter, which was refused by the U.S.[121]

As we ponder the future specter of potential nuclear proliferation among the non-nuclear states, and the accompanying demands for nuclear weapons, components and fissile materials fed by the factors described above, it is less-than-encouraging to remember that as far back as eight years ago in 1991, then Secretary of Defense William Cheney, in a post-Gulf War speech to the House Armed Services Committee stated, "By the year 2000, it is estimated that at least 15 developing nations will have the ability to build ballistic missiles - eight of which either have or are near to acquiring nuclear capabilities.[122]"

And it is still more disconcerting to know that, according to the National Defense University's recently published *Strategic Assessment 1998*, when attempting to evaluate the threats that could be posed by rogue states, "the only prudent assumption is that rogues will acquire and threaten to use WMD as the surest perceived way of neutralizing and deterring superior U.S. might. Thus, the general trend is toward increased destructive power in the hands of fringe regimes that can strike asymmetrically at the powerful democracies they oppose."[123] All of these factors lead to one inescapable conclusion: the demand for nuclear weapons is growing.

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[121] Terence Hunt, Associated Press, "N. Korea warned against weapons", Seattle Times, Sunday, November 22, 1998, A3.

[122] Speech by Secretary of Defense William Cheney to the House Armed Services Committee, 19 March, 1991 quoted in Michael Klare, Rogue States And Nuclear Outlaws[America's Search For A New Foreign Policy], (New York: Hill and Wang, 1995) 131.

[123] NDU, Strategic Assessment 1998 Projecting Power for Peace, 14-15.

THE DEMAND FOR A NUCLEAR WMD BY TERRORIST ORGANIZATIONS AND SUB-STATE GROUPS

During the Cold War, the Soviet Union and East Germany, in an effort to destabilize the NATO rear areas provided sanctuary, training, equipment and funding for a myriad of European terrorists organizations such as the Bader Meinhof gang and the Red Army Faction in West Germany, the Irish Republican Army in Northern Ireland and the Red Brigade in Italy. Today, the mantle of international sponsor of terrorism is worn by countries such as Iran, Syria, Algeria and Libya all of which are considered rogue states as described above and each of which are covertly pursuing, among other things nuclear weapons.

Therefore the demand for a nuclear device on the part of a sponsored terrorist organization would mirror the demand held by that rogue state, both of which would see an act of terror through the use of a nuclear WMD against an enemy as a means to an end. Any factors which would increase that demand or desire in the rogue sponsor country would naturally be passed on to the sponsored group within the U.S. The ability to use a shadowy sponsored group to do the dirty work in the United States would leave the rogue sponsor with plausible deniability and safe from retribution.

We know from chapter two that terrorist groups in general have continued to seek better and more violent methods to accomplish their missions but it is important now to address, the question of who are the terrorists or non-state groups which could cultivate a demand for a nuclear weapon?

The groups of most concern are those who would use violence to achieve a political end. Groups such as drug cartels and other organized crime elements may not be likely candidates willing to pursue a nuclear WMD, because they traditionally use a

different form of violence to accomplish their economic purpose[124]. However organized crime could become involved in the supply side of weapons or fissile material as well as serve to insure the transferability of such goods to the site of market demand (Organized crime's participation in fissile material transfer will be covered in the chapter on transferability). This leaves us with the groups that could be categorized as terrorist organizations.

WHO ARE THE TERRORISTS?

In addition to the Middle Eastern variety of terrorist or the Northern Irish Catholics and Protestants that filled the news in the 1970s and 1980s, there are many other terrorist groups that are known to exist and who have engaged in the killing of innocents. Appendix D provides a reprinted list of the currently recognized terrorist organizations many of which were active in 1997. This list is an excerpt from the most current U.S. Department of State publication dealing with global terrorism entitled "Patterns of Global Terrorism: 1997", U.S. State Department publication number 10535.

In addition there are several countries who have made it a practice to use terrorist groups as a weapon of plausible denial, to covertly attack countries or people to achieve military, political or religious aims. Countries that are currently ranked as sponsors of terrorism by the U.S. State Department are shown in figure 13. This ability to maintain plausible denial is one of the critical factors a country must evaluate before committing terrorist forces. By using shadow forces, such as terrorists, a country could strike a blow against a much stronger opponent and, by maintaining plausible denial, avoid retaliation.

However this shield of plausible deniability may be carefully stripped away over time through dedicated forensic evidence-gathering and investigation, which can allow the victimized country to trace the method of terror back to the sponsoring country and

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[124] William H. Webster, Project Chair, The Nuclear Black Market, Global Organized Crime Project, center for Strategic and International Studies, 1996, 17,18.

exact justice. Therefore the country that decides to go ahead and sponsor a terrorist attack against another country, must use a method that will leave investigators little to no evidence and in so doing, grant the sponsoring country the greatest chance to maintain plausible denial. Such a method may include an improvised nuclear device.

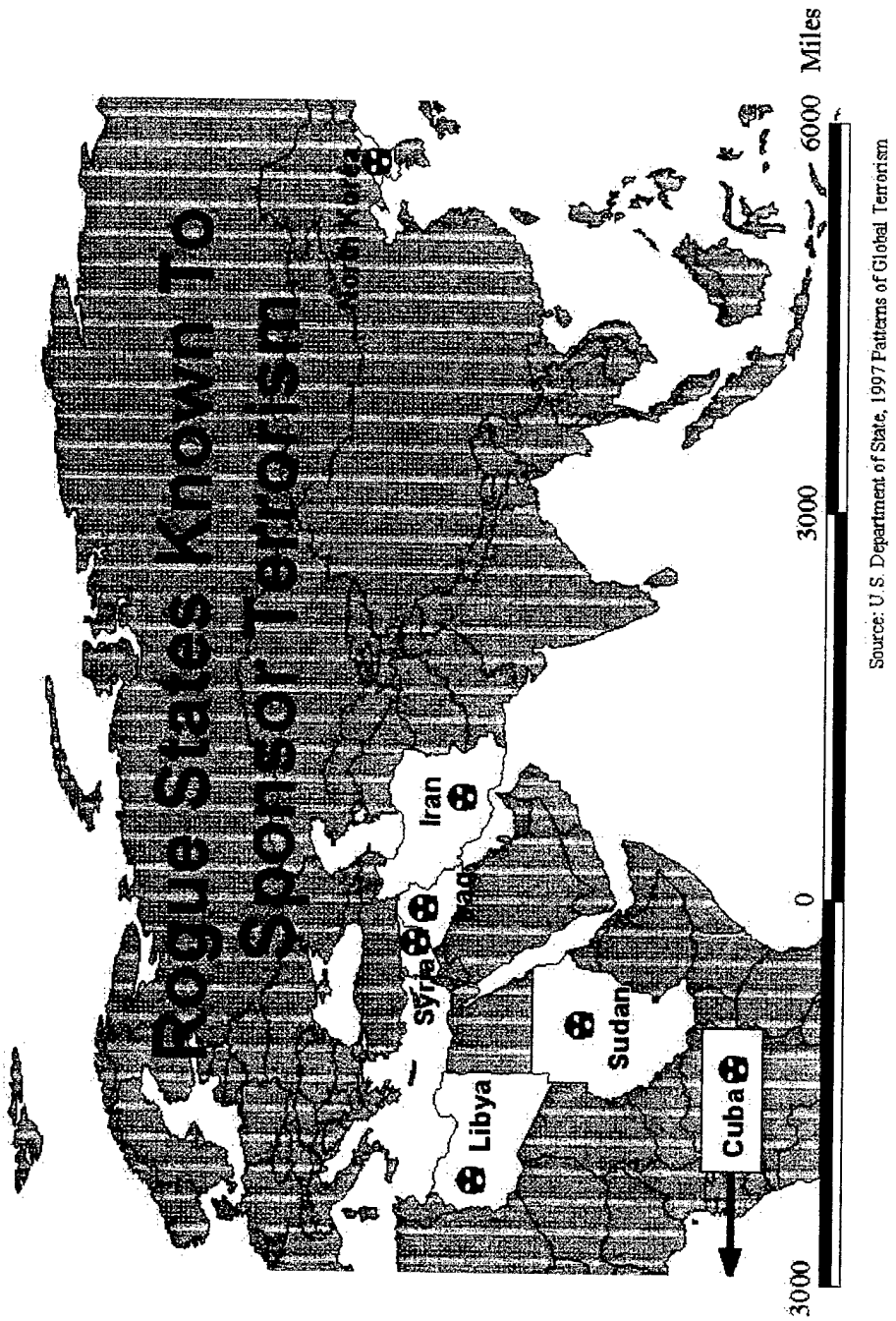

Figure 13 Rogue States Known To Sponsor Terrorism

But we should not limit our view of terrorists and terrorism to the known groups only or we will miss noticing potential threats on the horizon until it is too late. We must understand that terrorism is first and foremost a political concept.[125] The terrorist advocates the planned and systematic use of force[126], which is naked political power, to achieve a change in their particular political situation. As C. Wright Mills once wrote "All politics is a struggle for power" and "the ultimate kind of power is violence."[127]

Therefore, to recognize future potential terrorist threats and the methods they may be willing to use to achieve their political goals, we must first understand that there have been many terrorists in history and that we may not have recognized them simply because of the fact that history is written by the victors. A group fighting for what they believe to be right will be reviled and denigrated in the press and media and in the eyes of all those who oppose them during the time of their terrorist activities. But if their methods win the day, the history that is written, their history, will remember them as patriots and heroes.[128] The definition of a terrorist is simply based on a person's point of view, in fact the saying "one man's terrorist is another man's freedom fighter" is something we must be aware of and we have only to look at our own history to see this is so.

One group of citizens destroyed private property in an effort to achieve political aims and later began hoarding guns and ammunition at safe-houses for what they saw as an inevitable confrontation with the authorities. Had the established government been more effective in quickly dealing with these militias, the North American Insurrectionists who took part in the Boston Tea Party would surly have been hung for their seditious acts.

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[125] Hoffman, Inside Terrorism, 14.

[126] Hoffman, 131.

[127] C. Wright Mills, The Power Elite, (London, Oxford University Press, 1956) 171.

[128] Hoffman, Inside Terrorism, 28, 29.

It is important to note that this destruction of private property for political reasons by an organized group is well within today's definition of a terrorist act as held by the United States Federal Bureau of Investigation which states that terrorism is "the unlawful use of force or violence against persons or property to intimidate or coerce a Government, the civilian population, or any segment thereof, in furtherance of political or social objectives"[129].

On the other side of the world during a more modern time, the British government, which was the legitimate governing body of a region was often and violently attacked by terrorist organizations such as the "Stern Gang" and the "Irgun" both of which attacked Arab villages, British officials and headquarters, and blew-up British installations.These groups were comprised of "freedom fighters" like Itzak Shamir and Menachem Begin, both men committed to the establishment of an independent Jewish state.[130]

The important factor to remember is that any one of these groups both foreign and domestic can wear the label of "terrorist" because they all are trying to change a policy or inflict retribution. Prime Minister Benjamin Netanyahu of Israel defined a terrorist this way: "Terrorists are [those] out to terrorize the public at large, with the intent of compelling some kind of change of policy, or else as retribution for the government's failure to follow the policies demanded by the terrorists."[131]

But, in this age of potential threats from WMD, I believe this definition of a terrorist is too restrictive and causes us to close our eyes to other potential groups out

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[129] Federal Bureau of Investigation, Terrorism in the United States: 1995, (Washington, DC, U.S. Department of Justice, 1996) ii.

[130] Tony Lesce, Wide Open To Terrorism, (Port Townsend, Washington, Loompanics Unlimited, 1996), 7.

[131] Benjamin Netanyahu, Prime Minister of Israel, FIGHTING TERRORISM How Democracies Can Defeat Domestic And International Terrorists, (New York: The Noonday Press, 1995) 8.

there because we may believe that a particular group is not really "out to terrorize the public at large". Author Tony Lesce in his book *Wide Open To Terrorism* offers a more effective definition of terrorism and with this definition we enhance our ability to better identify potential terrorist groups now and in the future: "Terrorism is a problem solving technique. A group of people, or an individual, have a grievance against a social system, social agency or even an employer or former employer. Unable or unwilling to solve the problem through legal channels, they adopt violence to cope with their problem".[132]

Given this new view of terrorism, today on our "threat radar", we can see pro and anti-abortion groups, eco-defenders, animal rights groups, religious fundamentalists, religious fanatics, millennium cultists, anarchists, right and left-wing paramilitary organizations and militias of varying hues, and this is just within our own borders and does not even include international groups and organizations that may harbor hatred or ill will towards the United States government or citizens.

As we look at potential terrorists, special mention must be made to highlight the fact that as of this writing, the United States and it's NATO allies are at war with the country of Serbia and are bombing targets through-out the region. Therefore "Fifth column" attacks by Serb-backed groups within the United States against American targets could be instigated and would be seen by the population of Serbia as a legitimate quid-pro-quo, and have in fact already been called for by the forces of Serbia.[133]

The call to arms to Serb-Americans, which manifested itself as a Serb-language fax sent to several Orthodox churches in Sacramento, California, Milwaukee, Chicago and Indianapolis, has been taken seriously by the FBI's counterterrorism department. And military bases, nuclear weapons labs and other key installations have been alerted

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[132] Lesce, 10.

[133] Chuck Hornbach, reporter for National Public Radio on 15 April, 1999, stated that Orthodox churches in the U.S. have received faxes from Serbia calling for attacks against U.S. Targets.

electronically to the potential for attack. According to the FBI, "The threat letter requested that all Serbian nationalists living in America take action against the NATO decision to intervene in the Serbian-Kosovo conflict by killing as many American soldiers in the United States as necessary to stop the NATO attacks in Serbia."[134]

TERRORIST METHODOLOGY[135]

Terrorists can come from many different sources as shown above, and all of these potential groups can be separated into two basic camps, a secular camp and a religious camp. The terrorist from the secular camp will tend to have a belief system similar to the IRA terrorist who once said that "You don't bloody well kill people for the sake of killing them."[136] This is because the terrorist from the secular camp is seeking to influence and create change in a population whereas the terrorist from the religious camp believes that the execution of violence "is often an end in itself a sacred duty executed in direct response to some theological demand or imperative."[137] The terrorist from the religious camp serves a divine being or figure and so is unconcerned with influencing a population. In America's heartland, "the use of violence is justified by theological imperative as a means to overthrow a reviled secular government and attain both racial purification and religious redemption."[138] This type of religious fervor provides the religious terrorist with much more freedom to use greater and more destructive means of violence to accomplish his god's wishes.

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[134] "FBI Probes Serbian Terrorist Threats", Army Times, 26 April, 1999, 3.

[135] For an extensive survey into terrorism, it's history and methodology see Walter Reich, ed., Origins of Terrorism Psychologies, ideologies, theologies, states of mind, (Washington, DC, Woodrow Wilson Center Press, 1998) and Bruce Hoffman, Inside Terrorism, (New York, Columbia University Press, 1998).

[136] Hoffman, Inside Terrorism, 168.

[137] Hoffman, 168.

[138] Hoffman, 105.

The terrorists commitment to the cause and the morality that supports it allow them to justify doing what must be done to achieve their goals. For many terrorist groups the ends does in fact, justify the means. And groups that were from the religious camp would surly be willing to use any and all assets at their disposal, to include threatening to use a nuclear WMD if they believe their cause was divinely approved[139].

Some people argue that a group that uses violence or threatens the use of massive violence only turns the population away from their cause. And some terrorism experts even claim that "terrorists want a lot of people watching and a lot of people listening and not a lot of people dead"[140] Therefore they believe that violence on a WMD-scale would probably not be an option open to a group interested in a change in the political, economic or religious situation of a country or region. This reasoning may be true and could apply to some of the groups that would be found in the secular camp, but it is certainly not true for the groups found in the religious camp who "feel little need to regulate or calibrate their violence."[141]

Many terrorist groups, once they have started down that road have already given-up on the idea of moral persuasion, negotiations, compromise and the ballot box to win hearts and minds and change policy. They see the use of violence as a shortcut method to achieve their goal and will view a majority of the population-at-large as mindless sheep oblivious to the threats and the important problems surrounding them and in need of guidance. According to a leader of the United Red Army "There is no other way for us...Violent actions are shocking. We want to shock people everywhere...It is our way of

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[139] This assertion is presented based on information gathered during my interview with Special Agent Barry Tobin, WMD coordinator for the Seattle office of the FBI on 30 April, 1999 in which we discussed reasons why terrorists from the religious camp would be willing to use a nuclear WMD.

[140] Hoffman, Inside Terrorism, 198.

[141] Hoffman, 167.

communicating with the people."[142] And this type of communication continues to be used through-out the world, especially in Europe. In figure 14 we can see that during the period 1992 –1997 Europe averaged 121.5 terrorist attacks a year with the high point being 1995 when they suffered 272 attacks. The United States, on the other hand had seen relatively few terrorist attacks prior to the 13 recorded in 1997.

The terrorist believes that a successful act will serve as a "wake-up call" and later, be seen by history as a turning point towards a better life for all or as an act of faith that will be rewarded in the afterlife. The only difference between the two camps is the amount of violence each is willing to employ.

[142] Hoffman, Inside Terrorism, 131, 132.

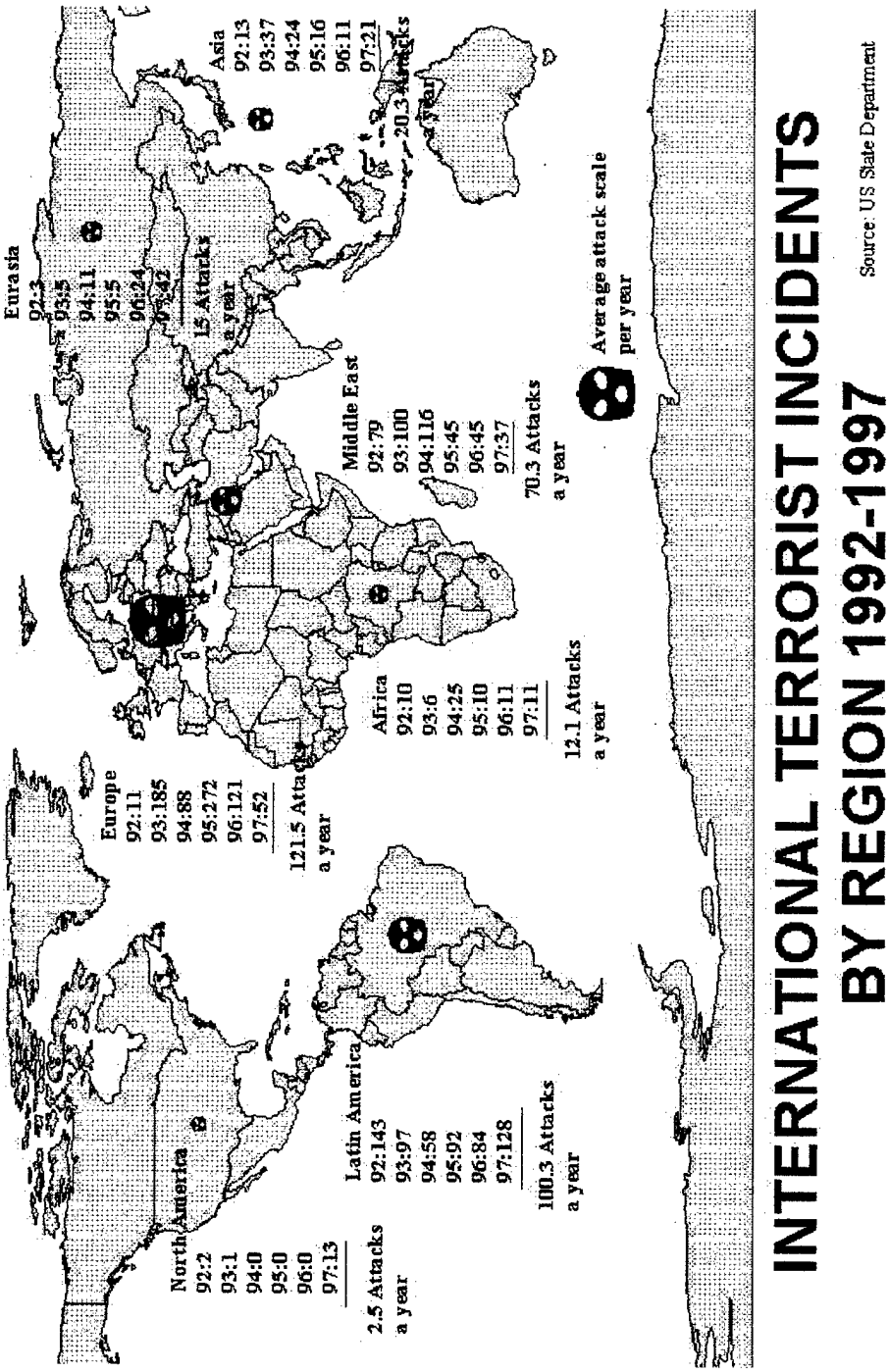

Figure 14 International Terrorist Incidents By Region

COLLATERAL DAMAGE

Although many of the groups from the religious camp have little qualms with killing civilians and other non-believers in the service of their faith, many of the secular groups will still need to take some refuge in the fact that they can justify the killing of innocents by simply telling themselves that they are at war "serving a moral purpose" and therefore are willing to adopt the practices of war which have been demonstrated by governments throughout the 20th century.[143] These practices, which included the willingness by countries to accept a certain level of "collateral damage" (undesirable civilian deaths) if the tactical, strategic or humanitarian value of the mission is high enough, have been justified in the minds of all 20th century leaders who have had to engage their military forces.

The practice of accepting the risk of collateral damage as the price of accomplishing the desired political or military goal was recently brought to the forefront again in April of 1999 during the war with Serbia. After a tragic bombing incident that left fifty-plus Kosovo refugees dead; the Clinton administration and NATO apologized for the unfortunate bombing of the refugees that they were trying to save, but then quickly reminded the Serbians that, despite this tragic loss of life, the mission would still go on. This sent our enemy the message that we were prepared to accept collateral damage as part of the price of victory .[144]

This same justification can easily be adopted by the secular terrorist who, having seen himself as a soldier at war will therefore accept that forces under his control may conduct operations that will result in the death of many innocent civilians. By using

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[143] Albert Bandura, "Mechanisms of moral disengagement" in Walter Reich, ed. Origins of Terrorism, (Washington, DC, Woodrow Wilson Center Press, 1998), 173.

[144] As of May 23 there have been 11 NATO "bombing errors" confirmed "to some degreee" by NATO. Associated Press, "NATO mistakenly bombs rebel stronghold", The Seattle Times, 23 May 1999, A3.

various "mechanisms of moral disengagement"[145] the terrorist can accept that these unfortunate casualties are the sacrifice necessary to accomplish a greater good which will, in the end, and according to his group's beliefs, result in a better life for all. Ironically, this justification which has been used in the past to salve the wounded soul of a world leader who's military action has inadvertently killed innocent civilians, may be the same justification used by a terrorist soldier contemplating the deliberate use of a nuclear WMD.

Perhaps the biggest factor which may cause sub-state groups and terrorists to begin thinking of obtaining a nuclear WMD with greater consideration is the ever-increasing perception that the FSU is become a very porous region filled with desperate workers with many economic troubles that can only be salved by hard currency. This perception in the minds of terrorists could lead to the belief that maybe fissile material can be obtained and smuggled out of the FSU.

It is no secret that the Russian economy and its people are indeed suffering. As early as 1991 Russians, East Germans and other former members of the Warsaw Pact were willing to sell anything and everything to obtain hard currency. In the West German border village of Hof, located on the former border between East and West Germany, I met numerous Russian and East German soldiers who had filled their plywood and metal Trabant cars with automatic weapons, grenades, uniforms, maps etc. and were willing to sell them all. A new AK-74 Kalashnikov automatic rifle complete with ammunition was available for $50 dollars. Later that year, in Nuremberg, I met with a German friend who, together with 3 friends had driven east into the Czechoslovakian military training site at Cheb with a flat-bed truck and purchased a T-62 main battle tank for $400 dollars![146] And while in Moscow in 1997, at Izmailovsky Park, the largest out-door market in the area, I saw a large display of over a hundred religious icons, the very soul of the Russian

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[145] Bandura, 161-191.

[146] Author served in Germany as part of the US Armed Forces from 1988-1992.

orthodox church, up for sale. The situation and plight of the people was heart-rending. I was even quietly offered the opportunity to buy the dress-uniform coat of former Defense Minister Pavel Grachov, which had been stolen from the cleaners!

And in the beautiful metro stations of Moscow, gangs of gypsy children rob unsuspecting tourists while legless Afghan war veterans sit in the cold of the Moscow winter reading a book proudly, but gladly accepting the generosity of strangers who pass by. Army colonels who by day work in the Russian version of the Pentagon, by night stock shelves at the western grocery stores to make ends meet.

All the while young Army conscripts try to bum cigarettes and money on the snow-covered streets outside which are dotted at each corner by very old pensioners, many of them veterans of the great war against fascism, who stand praying and accepting the offerings of the younger generations whose country they saved from tyranny. What was obvious to my eyes was confirmed by my Russian friends who said, "these are hard times" and "all of Russia is for sale"[147].

And this knowledge is not exclusive to people within the FSU who see the effects on a daily basis. The temptations by potential sub-state groups or terrorists to pursue obtaining nuclear weapons or fissile material from the economically troubled FSU are possibly being fueled by the stories that abound in the press and feed this demand. Stories

[147] Russian conversations with inhabitants of Moscow during the period 3 January,1997-20 April, 1997, and with residents of Irkutsk and Vladivostok later that same year.

with titles like: "Russia's Nuclear Flea-Market"[148], "Russia's Nuclear Sieve"[149] and "Potatoes Were Guarded Better".[150]

The factors which apply to terrorists seeking fissile material for a terrorist WMD do not apply only to groups that seek to attack the United States or its allies. In fact, in 1995, Russia herself was placed in a position to become keenly aware of the potential destructive force of a WMD.

For months the citizens of Russia had heard the threats that have been made by the Chechen terrorist Shamil Basaev who had stated his demand for nuclear weapons and had threatened to break into one of Russia's nuclear weapon storage facilities and steal and use a nuclear weapon on Russian soil.

While writing a story for Komsomolskaia Pravda in July of 1995 entitled "Could Shamil Basaev steal an Atomic bomb?" reporter Aleksandr Hohlov interviewed, the Deputy Director in charge of the protection of nuclear information, installations and materials for the Russian Ministry of Atomic Energy, Viktor Roshchin. Mr. Hohlov questioned the Deputy Director and ask him how much validity he gives to Basaev's threats. The Deputy Director stated that he believes "that Basaev is bluffing". He then

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[148] Andreas Heinrich and Heiko Pleines, "Russia's Nuclear Flea Market Tempts Smugglers", Transition, Vol. 1 No 21, 17 December 1995, 9.

[149] David Hoffman, "Russia's Nuclear Sieve Moscow meeting to focus on plugging safety gaps", Washington Post, April 17, 1996, A25.

[150] Oleg Bukharin and William Potter, "Potatoes were guarded better", Bulletin of the Atomic Scientists,May-June,1995.

http://www.bullatomsci.org/issues/1995/mj95/mj95.bukharin.html

went on to reassure the people that Russia has "a highly reliable system of protections and defense for our nuclear installations, munitions and materials."[151]

But when the Chechen terrorist Basaev sat down to a television interview in November later that same year, he told the reporter that he had kept his vow and planted nuclear materials in Izmailovsky Park, located on the outskirts of Moscow.

According to Authors Andrew and Leslie Cockburn, in their book *One Point Safe*, the TV crew immediately returned to Moscow and, "with cameras rolling" dug-up a container that later proved to be highly-radioactive Cesium 137. The crew then immediately notified officials. Soon Izmailovsky Park was crawling with reaction teams and special agents. The radiation levels allowed for Moscow "had been exceeded by a factor of 310", but again, the citizens were assured that they had been safe and in no danger.[152]

Had this Ceisum-137 container been surrounded by explosives and detonated during one of Izmailovsky Parks busy weekends, Moscow would have rivaled Tokyo for WMD honors as the first city to be attacked by a WMD.

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[151] Aleksandr Hohlov, "Smozhet li Shamil Basaev Ukrast Atomnuiu Bombu?", Komsomolskaia Pravda, Saturday, 22 July, 1995, 1.

[152] Andrew and Leslie Cockburn, One Point Safe, (New York, Anchor Books, 1997), 220.

CHAPTER 6: THE POTENTIAL SUPPLY OF FISSILE MATERIAL AND NUCLEAR WEAPONS

Fissile material such as plutonium and highly enriched uranium (HEU) are substances that do not exist naturally on earth. These substances were created in controlled environments and at great expense and therefore are, in most countries, highly valued and heavily guarded. But unfortunately after the collapse of the Soviet Union there was a period during the political chaos that ensued where the security apparatus for this material broke-down and subsequently, several hundred attempts by both ordinary citizens and criminals alike were made to smuggle various types of nuclear material out of the FSU.[153]

According to reports, many of these early attempts in 1991-94 were the work of non-professionals and scam artists.[154] But the perception that people within the FSU may be able to actually smuggle quantities of fissile material out and offer it up for sale has caught the attention of potential buyers, specifically by state sponsored terrorist organizations in the Middle East who have already offered large sums of money for intact warheads[155].

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[153] Graham T. Allison, Owen R. Cote, Jr., Richard A. Falkenrath and Steven E. Miller, Avoiding Nuclear Anarchy: Containing the Threat of Loose Russian Nuclear Weapons and Fissile Material, CSIA Studies in International Security No 12, (Cambridge, Massachusetts, The MIT Press 1996) 23 and Rensselaer W. Lee III, Smuggling Armageddon The Nuclear Black Market in the Former Soviet Union and Europe, (New York, St. Martins Press 1998), 3.

[154] Interview with Special Agent Johannes M. Funke, Bundeskriminalamt, in Garmisch, Germany, 1996.

[155] See William H. Webster, Project Chair, The Nuclear Black Market, Global Organized Crime Project, Center for Strategic and International Studies, 1996,15.

It is also important to remember, however, that when referring to a "supply of fissile material" the reader should not assume that this refers to a sustainable flow of fissile material from its storage sites out to a market over a period of time as may be the case with other goods, but rather should understand that trade in fissile material or a nuclear warhead should not be measured by the ton as is the case with other goods, but rather should be measured by the individual incident itself.

Any one-time successful theft from a storage site, such as Tomsk-7 which contains "approximately 23,000 canisters, each containing 1-4 kg of fissile material (plutonium metal, plutonium oxide, uranium metal or uranium oxide) from disassembled nuclear weapons"[156], by an individual or group which can subsequently be made available for sale, qualifies as having met the criteria to establish the existence of a supply - the second and final part of the two primary sub-components of the Complementarity factor (Demand & Supply).

The fact that fissile material successfully smuggled out of the FSU will fetch a high price is believed to be known to both organized crime elements and nuclear storage workers among others which may lead to better organized attempts by professionals and others willing to try their hand.[157] Therefore it is important to identify the factors which

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[156] The Monterey Institute of International Studies and The Carnegie Endowment for International Peace, Nuclear Successor States of the Soviet Union: Status Report on Nuclear Weapons, Fissile Material and Export Controls, No 5, March 1998,(Carnegie Endowment for International Peace, Washington, DC in cooperation with the Monterey Institute of International Studies, Monterey, CA, 1998) 57.

[157] Yuri Totrov, Member of the Board of Directors of the Association of Retired Intelligence Officers of Russia, Interview by Max F.X. Gutierrez, Jr. 30 January, 1997, Moscow Russia. According to Mr. Totrov, knowledge of the potential profits that could be made from the theft of Russian fissile material is known not only to potential profiteers, but also by many concerned people in Russia who recognize its potential use by Islamic terrorists against both the United States and possibly even against Russia herself.

may cause such groups to try to obtain this material and in so doing, establish a supply of Russian fissile material that could be traded on the black market.

COMMODIFICATION, THE FIRST STEP TOWARDS ESTABLISHING A SUPPLY

The process of commodification of a substance or item begins when people first become aware, either by word of mouth, news reports or experience, that an item, previously thought to have little or no monetary value, now has a market value price. Then, when the people realize that they may be able to gain access to a potential customer base for this item they may begin to evaluate the possibility of obtaining and selling that commodity. This was the case for Russian fissile material.

Perhaps an important factor which influenced people then (and perhaps even today) to try to obtain various items and sell them for profit is to remember that during the days of communism, it was not considered unusual to take state-owned property and use it for your own purposes or to skim some state property from the top and use it as barter to trade with neighbors. Such actions were not considered stealing in the minds of those who did so[158]. According to Andrew and Leslie Cockburn in their book *One Point Safe*, which deals with various issues involving the threat of nuclear smuggling, "There had long been an attitude among naval officers [for example] that stealing from the state was not stealing. Stealing, selling, swapping-anything went so long as it didn't sink the ship"[159].

But during the time of the Soviet Union, nuclear materials were never seen by the Soviet populace as marketable products with a monetary value because their use outside

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[158] This belief was also relayed to me during my 1997 discussions in Moscow with several Russian friends who claimed that skimming state items and materials from the top and using them to barter amongst themselves was not unusual during the days of communism.

[159] Andrew and Leslie Cockburn, One Point Safe, (New York, Anchor Books Doubleday, 1997) 72.

the lab or storage facility was almost non-existent, therefore, "the lack of a domestic market value for nuclear material also eliminated the incentive for nuclear theft[160]." And because the population of the FSU suffered from an "extraordinarily centralized state with pervasive internal security measures[161]" its potential uses as a terrorist weapon by dissidents or rebel groups was never really considered because this exceptional security apparatus "made the threat of nuclear terrorism virtually non-existent.[162]" In addition, the workers at the plants and production facilities within the nuclear complex were all highly paid and highly motivated and had undergone screening that made them highly reliable.[163] And so it was this state of affairs which kept fissile material from being commodified in the FSU for over fifty years.

But, with the collapse of the FSU, the Russian government was no longer able to continue to subsidize the privileged cities and workers in both the nuclear industry and the military so the paychecks began to stop arriving and the guards started to desert their posts[164]

The Previous system which kept the nuclear stockpile safe and secure from commodification was based on regulations and ordinances, which either are no longer in

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[160] Oleg Bukharin and William Potter, "Potatoes were guarded better", The Bulletin of the Atomic Scientist, May/June 1995.

http://www.bullatomsci.org/issues/1995/mj95/mj95.bukharin.html

[161] Bukharin, "Potatoes were guarded better."

[162] Bukharin, "Potatoes were guarded better."

[163] Vladimir Andreevich Orlov, Editor in Chief of the Journal Yaderny Kontrol, "Iadernii Shantazh: Ugrozy "Vnutrennikh Vragov" Nastorazhivaiut Bolshe, Chem Proiski Izvne", Nezavisimaia Gazeta, 29 August, 1997, 6.

[164] Andrew and Leslie Cockburn, One Point Safe, (New York Anchor Books, Doubleday, 1997) 78.

place or are not effective, and upon military discipline and a sense of responsibility that no longer exists"[165]

Vladimir Orlov in his article entitled "Nuclear Blackmail" explains that a majority of the nuclear facilities in Russia are without the necessary defensive measures, such as vehicle barricades to prevent ramming, outside lighting along the fence line which surrounds the site, no electronic warning systems with battery-powered back-up and no television monitoring systems. In addition, the highly trained soldiers of the Ministry of Internal Affairs (MVD) which used to guard these facilities are rapidly being replaced by old women from an auxiliary service who must "close their eyes tight to shoot their pistol on the training range."[166]

In his article on nuclear blackmail, Vladimir Orlov presents a description of the conditions seen by a representative of the Ministry of Defense who conducted a visit to a nuclear facility in the fall of 1996. The representative saw that the workers have no money and no place to live. A major who was to work on nuclear weapons could not because he was too hungry. Some officers did not get paid for 3 months at a time and no food allowance for up to 8 months at a time.[167]

This has led to "the primary threat to nuclear safeguards in Russia today - the knowledgeable and corrupt insider (or group of insiders) who have access to nuclear materials and [who] may attempt to steal them for profit, for political reasons, or because

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[165] Quoted in: The Monterey Institute of International Studies and The Carnegie Endowment for International Peace, Nuclear Successor States of the Soviet Union: Status Report on Nuclear Weapons, Fissile Material and Export Controls, No 5, March 1998,(Carnegie Endowment for International Peace, Washington, DC in cooperation with the Monterey Institute of International Studies, Monterey, CA, 1998) 54.

[166] Vladimir Andreevich Orlov, Editor in Chief of the Journal Yaderny Kontrol, "Iadernii Shantazh: Ugrozy "Vnutrennikh Vragov" Nastorazhivaiut Bolshe, Chem Proiski Izvne", Nezavisimaia Gazeta, 29 August, 1997, 6,7.

[167] Orlov, 6,7.

they are coerced by a criminal organization.[168]" Such insiders could be found in the ranks of the military according to author Vladimir Orlov. The Ministry of Defense recognizes the potential for blackmail and nuclear terrorism from within the ranks of the military due to the economic situation. The same is true for the civilians of Minatom, the Russian Ministry of Atomic Energy. Potential threatened action by such insiders to effect political or economic change could include detonating a radiological WMD which would contaminate and affect everything in a radius of about 100 kilometers, or the theft of 25 kilograms of Uranium or 5 kilograms of plutonium and then weaponizing it and attempting to force change through blackmail.[169]

The commodification of Russia's fissile material can be caused by many factors, but perhaps the newly found access to a free press has also played a key role in that commodification as evidenced by the interview with former nuclear plant worker Yuri Smirnov described below. This access to news, which was a by-product of the fall of the communist state, allowed workers and military personnel caught in dire economic situations to learn that there could be a lucrative cash market for their nuclear materials in the West. A very telling example comes from the PBS FRONTLINE documentary entitled "Loose Nukes" which aired on the 19th of November, 1997. During this program PBS conducted interviews with several convicted would-be smugglers of fissile material during that first window of opportunity. One such interview was with Yuri Smirnov, who is considered "the first known bomb-grade uranium thief in Russia". It is also interesting

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[168] Oleg Bukharin and William Potter, "Potatoes were guarded better", The Bulletin of the Atomic Scientist, May/June 1995.

[169] Vladimir Andreevich Orlov, Editor in Chief of the Journal Yaderny Kontrol, "Iadernii Shantazh: Ugrozy "Vnutrennikh Vragov" Nastorazhivaiut Bolshe, Chem Proiski Izvne", Nezavisimaia Gazeta, 29 August, 1997, 6,7.

to note that this is the only case of nuclear smuggling that has been "openly acknowledged" by the Minatom leadership of Russia[170].

During his interview, he is asked to "explain...why you think you did it, after all these years as an honest man." His answers give a unique view into the way fissile material was commodified in the minds of Russians, as well as some of the concerns and motivations that he, and other nuclear workers like him, had as they tried to decide how best to survive in the days following the collapse of the FSU:

> "Then came the reform of 1992, when money lost its value. I didn't have anything saved in the bank anyway, but prices began to rise much faster than salaries. Literally every week, every month, the gap grew and grew and became huge. I don't have expensive tastes, you know, but I was at a loss. I could buy nothing--no furniture, no clothing, nothing. So, I simply panicked. Of course, if I would have continued living like this, life would have settled into a new course. Things started gradually readjusting. Other people managed to adjust to these conditions--some went into trade, some into business. I had nothing -- all I had was home and the factory--factory and home. No friends with connections. No contacts in the trade business. And then, as luck would have it, I came across an article in Komsomol'skaya Pravda. I don't remember the title now. There were several people who stole uranium. It was not written what level of enrichment it was, ninety percent or not. But I remember the weight--1200 grams. That I remember exactly. I read it and it interested me. Before, such articles were not published. I simply thought, "imagine that!" I stored it in my memory, that's all. That was when I got this idea: to also siphon off uranium little by little, especially since we had a highly enriched

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[170] "Loose Nukes: Uranium, Plutonium, Who's Got the Goods? Nuclear Nations Ask", Wall Street Journal, May 11, 1994, p. A1, and Allison, Avoiding Nuclear Anarchy: Containing the Threat of Loose Russian Nuclear Weapons and Fissile Material, 24.

> uranium, up to ninety percent enriched uranium 235. So this idea formed--but how to sell it...to whom, and how. I had no idea. It was only later, when I thought back to what I had done, I realized that for me it was simply a psychological exit from this economic stress. I had found a solution and already it was easier for me to live and breathe and somehow I could see a ray of light ahead because I would have this back-up. It was just a kind of defense against that stress" [171].

The commodification of fissile material was completed when Russian insiders like Smirnov, with access to nuclear materials, as well as various criminal organizations understood its true market value. This realization was fueled when potential buyers, like Iran, offered to pay large sums for fissile material. According to the Center for Strategic and International Studies Task force on the Nuclear Black Market, "Iranian agents have scoured the FSU searching for nuclear materials, technologies, and scientists" and that, in 1993 Islamic Jihad representatives offered to pay $2 billion dollars to the director of the Arzamas-16 storage site for a warhead. [172]

The potential for such theft is present according to Anita Nilson, a representative from the International Atomic Energy Agency (IAEA) who said in 1996 that, based on information she had gained from working on the international data bases that track nuclear theft incidents, a determined group could carry-out a theft of nuclear material from Russia. [173]

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[171] Interview with Yuri Smirnov, PBS FRONTLINE, Loose Nukes, WGBH Boston Public Television, November 19,1997.

[172] William H. Webster, Project Chair, The Nuclear Black Market, Global Organized Crime Project, Center for Strategic and International Studies, 1996,15.

[173] Vladimir Andreevich Orlov, Editor in Chief of the Journal Yaderny Kontrol, "Iadernii Shantazh: Ugrozy "Vnutrennikh Vragov" Nastorazhivaiut Bolshe, Chem Proiski Izvne", Nezavisimaia Gazeta, 29 August, 1997, 7.

THE FRAMEWORK FOR ESTABLISHING A FISSILE MATERIAL SUPPLY

Before a quantity of fissile material or even an intact warhead can be stolen and then offered-up on the black market by such a determined group in Russia, they must first go through and complete certain criteria. They must: Identify a target location with fissile material; Identify a person with access to or knowledge about the material and evaluate their susceptibility to incentives; Create an opportunity to obtain the material; Obtain the material and secure it; Seek out a buyer.

This process can be demonstrated using the flowchart shown in figure 15.

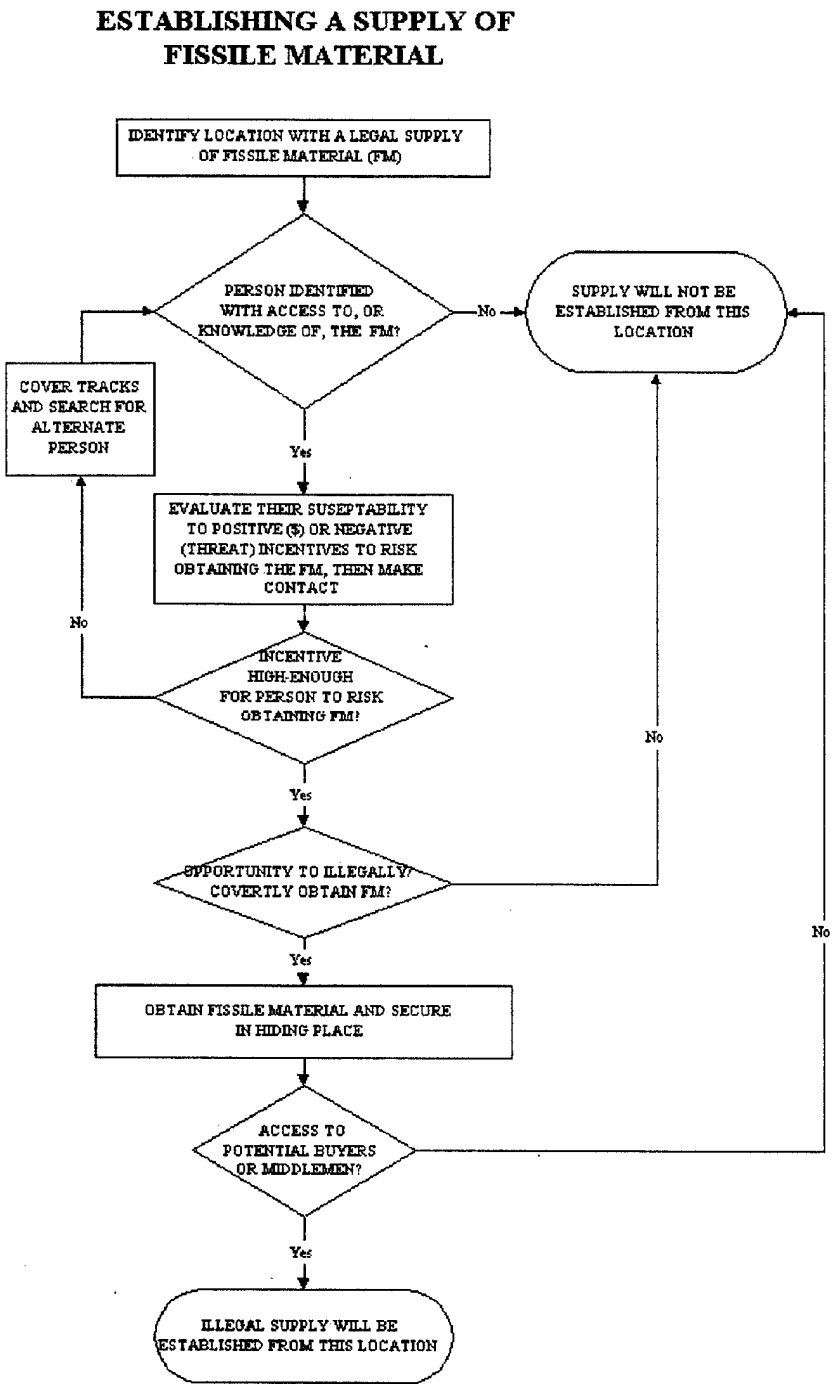

Figure 15 Supply Flow Chart

If we look closer at each of these criteria and insert the known facts from the open news sources, we can begin to see indicators that the potential for people to be willing to attempt to establish a supply of fissile material for sale to a black market is there and that Ms Nilson's prediction that a determined group could accomplish a theft of nuclear materials may prove right.

1. Identify a location with a supply of fissile material

According to the Monterey Institute of International Studies, in cooperation with the Carnegie Endowment for International Peace, there are a minimum of 39 known sites within the nuclear successor states of the Soviet Union that currently maintain a supply of fissile material. These sites, which were identified through non-classified materials and are included in Appendix B, do not include the numerous military bases equipped with strategic, theater or tactical nuclear weapons. When calculating the total number of sites that may contain weapons-usable nuclear materials the number is "nearly 100"[174]. But when attempting to calculate the total amount of actual fissile material that is present in the FSU we run into a problem. Some estimates exceed 1,200 tons of HEU and 150 tons of plutonium[175] but according to Dr. James Fuller, Director of the Pacific Northwest Center for Global Security, the actual amount is unknown, "even the Russians don't know".[176]

2. Identify a person with access to the supply

Such a person could be a nuclear plant worker such as the aforementioned Yuri Smirnov, a guard or other employee at a suitable laboratory, reactor site or storage facility with access to nuclear materials such as naval fuel rods for the Russian Northern

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[174] William H. Webster, Project Chair, The Nuclear Black Market, Global Organized Crime Project, Center for Strategic and International Studies, 1996, 20.

[175] Webster, 11.

[176] Speech by Dr. James L. Fuller, Ph.D., Director, Pacific Northwest Center for Global Security, given at the University of Washington, 12 March, 1999.

Fleet which were stored at Fuel Storage Area 3-30 in the Sevmorput shipyard near Murmansk.

This was the case in 1993 when Russian Navy Captain Alexei Tikhomirov and his younger brother Dimitry, broke into Area 3-30 where Dimitry worked and broke-off three reactor core rod sections containing 4.5 kilograms of enriched uranium. But in their search to find a buyer, they compromised their activity and were arrested.

Another potential person with access might be military personnel working in an area that stores completely assembled warheads which are kept on military bases such as Small Atomic Demolition Munitions (SADMs) or artillery and mortar shells in the 152mm, 180mm, 203mm and 240mm range[177].

In 1996, John Deutch, Director of the Central Intelligence Agency told Senator Sam Nunn (D-GA) and other members of the Senate Permanent Subcommittee on Investigations during hearings on the proliferation of weapons of mass destruction, that "a knowledgeable Russian has told us that, in his opinion, accounting procedures are so inadequate that an officer with access could remove a warhead, replace it with a readily available training dummy, and authorities might not discover the switch for as long as six months."[178]

3. The targeted person must believe that the incentives outweigh the risks involved in obtaining the item.

Perhaps the most important criterion that must be met is the fact that the risks involved to the person attempting such a theft must be outweighed by the incentives. Such incentives can be positive, such as the belief that a successful theft will result in

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[177] David C. Isby, Weapons and Tactics of the Soviet Army, (London, Janes Publishing Ltd., 1988) Chapter 11 Artillery.

[178] William H. Webster, Project Chair, The Nuclear Black Market, Global Organized Crime Project, Center for Strategic and International Studies, 1996, 1.

huge profits, or the incentive can be negative, such as the coercive techniques employed against the potential thief by organized crime elements[179]. Or the incentive to commit theft or assist in such theft by looking the other way can result from a persons deteriorating economic situation, which could force him to go against his moral beliefs of right and wrong in order to provide for and safeguard the well-being of his family.

This very real threat has already been manifested in numerous areas. For example according to a 11 February 1999 RFE/RL news report, the economic situation has become so bad that federal border guards in the Russian Far East have been reduced to collecting ferns and wild berries and growing whatever they can to feed themselves and their families. It is therefore very easy to imagine how tempting an offer of hard currency in exchange for looking the other way would be to one of these border crossing guards who is desperately trying to feed a family back home. But according to Major-General Mikhail Aganesyan, chief of staff for the Russian Far East Regional Directorate, this is not the case and explained that "his troops received only 30 percent of the money they were allotted in 1998, but that they still managed to do their job properly and "not a single trespasser slipped past their patrols."[180]

The situation in the federal armed forces is not much better and, according to information gathered from Defense Ministry 1998 statistics by the Internet mailing list Johnson Russia List (CDI Russia Weekly) the number of desertions and crimes in the services continues to rise. And CDI Russia Weekly reports that the number of suicides has risen to over 350 in 1997 with over 60 percent of those being officers[181]. The same picture is reported by *The Army Times* which also states that the situation in Russia's

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[179] Oleg Bukharin and William Potter, "Potatoes were guarded better", The Bulletin of the Atomic Scientist, May/June 1995.

[180] "Far East Soldiers on Natural Foods Regimen", RFE/RL Newsline Vol. 3, No. 29, Part I, 11 February, 1999.

[181] "Hundreds of Deserters Arrested; Problems Remain", CDI Russia Weekly, 29 January, 1999. djohnson@cdi.org

under-funded military is critical and moral is at an all-time low. Ruthless hazing of young conscripts, abysmal conditions and bad food have caused many soldiers to desert their units which has forced the government to conduct a massive 3-day round-up of deserters in January[182].

The difficult economic situation for nuclear workers was graphically illustrated to me during interviews I conducted with senior personnel at the Pacific Northwest National Laboratories (PNNL) in Richland Washington. While a guest of PNNL, I was given the very unique opportunity to see a video tape made by an independent Russian film team that was conducting what appeared to be an investigation of the Krasnoyarsk-26 Plutonium factory.

The workers at the plutonium factory believe that Krasnoyarsk-26 has a future as Russia's reprocessing facility for nuclear waste, and were promised as much by President Yeltsin during a recent visit. But, according to the film crew, that has not happened and the economic situation for the workers has continued to worsen as nuclear waste containers from throughout Russia continue to arrive for storage.

Today these workers go into the mountain which has hidden the plutonium factory by special train and none wears a dosimeter to measure their radiation exposure. When asked why they don't wear the dosimeter the workers replied that if they did, it would show that they had exceeded the maximum allowable dose due to the faulty shielding throughout the factory, but that they would be blamed for this and would loose their jobs.

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[182] "Russia nabs 626 Deserters", Army Times. 8 February, 1999, 4.

The film crew finally asks one worker if he could imagine a time when maybe he might not be so honest with regard to the plutonium stored there in the mountain. The worker shrugs his shoulders and looks around nervously, "maybe" he says quietly[183].

4. The person with access must then evaluate whether he can setup an opportunity to obtain the material and if so, obtain it

The accessibility that such workers have to fissile material and their potential ability to remove it from storage was also illustrated in the film on Krasnoyarsk 26. The film showed the storage room for plutonium, which had been produced there at the factory. The plutonium powder was stored neatly in small "milk" cans that were easily carried with one hand by the workers on duty. When the workers were asked what keeps the material from being stolen and sold on the black market, they replied that basically their integrity and honesty kept it safe.

In another example, Ambassador Thomas Graham, Jr., former Special Representative of the President for Arms Control, Non-proliferation, and Disarmament under President Clinton related, during an interview that employees who work at one particular storage site would routinely slip several HEU wafers into their coat pockets as they left the HEU containment rooms at the end of their work day and simply walk out[184].

Another example of the lack of effective security measures that are currently in place was provided by Mr. Yuri Smirnov[185] and is an excellent description of how he was able to illegally obtain fissile material:

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[183] Russian-made film (no name, possibly unauthorized) on Krasnoyarsk-26 Plutonium factory, viewed at PNNL, Richland, Washington.

[184] Ambassador Thomas Graham, Jr., President of the Lawyers Alliance For World Security (LAWS), interviewed by author, 21 January, 1999, Seattle, tape recording, University of Washington, Seattle.

[185] Interview with Yuri Smirnov, PBS FRONTLINE, Loose Nukes, WGBH Boston Public Television, November 19, 1997.

"To put my plan into action was not too difficult since I myself worked with the material. I weighed it myself and accounted for it myself. I knew when I could take some and how much I could take so that no one would notice. They keep track of every gram. But a process is a process: there are always spills, overflows, losses. So there's always a percentage of unplanned...so-called "irretrievable losses" -- around three percent. But if you're very neat and gather everything, then it was possible to siphon off around one percent a month for yourself. The rest nobody notices because everything goes into the special sewerage system, purification, and on to storage, then the purified water goes somewhere. Our purification is done very well.

So that's how I began. I'd take a fifty gram vial -- the kind we used to take samples to the laboratory. So when no one was looking during a smoke break or just when no one was there, I would measure off a little from the box into a vial, shake it off (still in the box), wrap it up, then take it out of the box and place it on a clean rag in gloves and wipe the vial with a special chemical solution. I would check the Geiger counter--how it crackled, how strong it crackled. But we only had a Geiger counter for Beta particles. If it didn't crackle, I would roll it up in clean paper and hide it in my pocket. Later, I'd throw it in my bag. That was it and I'd take it out of the plant.

There were no detection devices either at the entrance, the exit, or at the checkpoint. The only counters you had were to check your hands in the locker rooms, but it was your own responsibility to check your hands. That's the way I would get it out. Then I would bring it home and put it on the balcony. I had a little jar there and I would pour the stuff into - very carefully so that the dust wouldn't be blown away - very carefully poured it in and covered it up. I would take the same vial and paper and

everything, put it in a clean plastic bag, tie it up, and pack it. Then I would take it back to the factory the next day and throw it in with the waste to be burned up.

And that's how I did it. For three and a half months, I would take one or two vials at a time when it was possible. I knew when I could do it. A vial would hold approximately sixty grams--sometimes two vials, sometimes one. I didn't weigh it at home. I had no scale and I wouldn't do it, so as to not contaminate, but just roughly. Later the investigation found I'd ended up with 1,538 grams"[186].

In trying to determine the likelihood that Russians may be forced or coerced by situations or criminal elements to remove fissile materials from their storage sites, we need only to look at the economic situations that led to the events described above and compare them with the current economic situations in Russia today to see that examples like Yuri Smirnov may not be just isolated incidents in the future.

5. Begin the search for a buyer.

This is the area where many of the initial would-be smugglers made their mistake and were consequently apprehended. But with the introduction of organized crime elements into the mix, the picture begins to change.

John Deutch, Director of the CIA stated in 1996 that "some 200 large, sophisticated Russian criminal organizations operating worldwide have established working relationships with international smuggling networks." He also stated that these organizations "have connections to government officials that could provide them with

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[186] Interview with Yuri Smirnov.

access to nuclear weapons or weapons-grade materials and enhance their ability to transport them out of the country."[187]

It is important to remember that failure to meet the criteria outlined above will negate the ability of a person or organization to obtain the desired items from that particular site and will require the would-be thieves to select an alternate site.

Although Yuri Smirnov and Captain Alexei Tikhomirov had access to highly enriched uranium, some of the material that other people, bitten by the lure of big profits, have tried to smuggle out was made up of low-grade uranium ores or reactor trash and not useable for bomb-making, and the material that was useable was of very minute quantities.[188] One such case, which occurred on the 22nd of January, 1996, involved Swiss and Turkish citizens, in which 9 people were arrested and more than 1.2 kilograms of low-grade uranium were seized in Switzerland. One Swiss citizen of Turkish nationality offered samples of a supply of reactor uranium which he had stored somewhere in Turkey awaiting sale.[189]

But, there have been six significant cases, the earliest beginning around 1992, that involved larger and more noticeable amounts of material, and these known cases are "generally considered to be of major proliferation significance."[190] One such case involved a counterfeiter in Tengen, Germany. Police, investigating Adolf Jackle for a counterfeiting charge "accidentally" came across 5.6 grams of super-grade plutonium

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[187] William H. Webster, Project Chair, The Nuclear Black Market, Global Organized Crime Project, Center for Strategic and International Studies, 1996,1.

[188] The Monterey Institute of International Studies and The Carnegie Endowment for International Peace, Nuclear Successor States of the Soviet Union: Status Report on Nuclear Weapons, Fissile Material and Export Controls, No 5, March 1998,(Carnegie Endowment for International Peace, Washington, DC in cooperation with the Monterey Institute of International Studies, Monterey, CA, 1998) 105.

[189] "Schweizerish-turkischer Uranhandel aufgeflogen: Verhaftungen in beiden Landern", Neue Zurcher Zeitung, Friday, 2 February, 1996, 20.

(99.78 percent Pu-239). How Jackle came into possession of this very rare and dangerous material is still unknown, but German authorities believe that organized crime elements from Bulgaria may have been involved.[191]

One of the latest cases to appear, but which did not actually involve the transfer of materials, happened in Miami, Florida. This case involved two Lithuanian citizens who were members of one of the 25 Russian Mafia groups operating in the United States which agents refer to as "Redfellas". The case, which broke on 5 February, 1997, led to the arrest of the two men who had promised to supply Russian ground-to-air shoulder-fired missiles, weapons and explosives. The men also promised that they could supply Small Atomic Demolition Munitions (SADMs) from Russia as well. American Special Agents from the Odessa Task Force, posing as Colombian Drug dealers, were originally tracing the thefts of stolen cars by the Russian Mafia when they encountered the two weapons smugglers. The two Lithuanians were arrested when it became clear to the agents that they could probably deliver on their promise to supply the SADMs.[192]

STATUS OF THE NUCLEAR BLACK MARKET

The actual status of the nuclear black market remains (as is the case with all black markets) relatively unknown. But by continuing to apply the known facts such as those above to Ullman's Triad we may be able to obtain a more accurate picture of its status.

Today in 1999, many followers of the nuclear smuggling threat are still divided as to their belief in the seriousness of the issue. Author Rensselaer Lee, in an article entitled

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[190] The Monterey Institute of International Studies, 105.

[191] Graham T. Allison, Owen R. Cote, Jr., Richard A. Falkenrath and Steven E. Miller, Avoiding Nuclear Anarchy: Containing the Threat of Loose Russian Nuclear Weapons and Fissile Material, CSIA Studies in International Security No 12, (Cambridge, Massachusetts, The MIT Press 1996) 27.

[192] "Verhaftung zweier Litauer in Miami: Atomwaffenschmuggel nach den USA verhindert?". Neue Zurcher Zeitung, Wednesday, 7 February, 1997, 20.

"Smuggling update" which appeared in the May/June 1997 issue of the *Bulletin of the Atomic Scientists*[193], broke these "camps" into three groups; Those who believe that the threat consists only of amateurish smuggling and overzealous police sting operations; Those who believe that the threat consists of con artists, hucksters and swindlers; And those who believe that the threat consists of an entire underground network already in place and operated by organized crime elements and corrupt plant managers.

The first group, of which the Russian government is a part, shares the belief that the initial amateurish smuggling incidents typified by Yuri Smirnov and others are the worst we will see and that overzealous police officials from Europe will instigate other smuggling attempts by offering large sums in concert with sting operations to embarrass Russia and the other successor states. And that a prime example of this type of sting operation was Operation Hades, which was conducted by the Germans in 1994

This has already been alleged by the Russian government, who see sting operations such as "Operation Hades" which nabbed 363.4 grams of 87.2% enriched plutonium from a Lufthansa jet which flew from Moscow and arrived at Munich's Franz Josef Strauss Airport in 1994, "as politically motivated maneuver[s] against their country by the Germans who want international atomic controls implemented in Russia."[194] The belief that such sting operations were meant to place Russia in a bad light were echoed by the vice minister of Russian atomic energy, Yevgenni Mikerin, who stated that these were conspiracies by unknown parties using plutonium in concentrations and mixtures

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[193] Rensselaer Lee, "Smuggling update", Bulletin of the Atomic Scientists, (Educational Foundation for Nuclear Science) Vol. 53, No. 3, May/June 1997, 11-14.

[194] PBS FRONTLINE.

http://www.pbs.org/wgbh/pages/frontline/shows/nukes/timeline/t106.html and,

that Russia has never produced and then using it to conduct sting operations to make Russian fissile material security look ineffective.[195]

And by FSB chief Leonid Schebarschin who stated that he believes that such sting operations are meant to "put our nuclear potential under Western supervision. And in order to accomplish this, the Western services would use active steps or measurements to achieve that goal. This Operation Hades is a prime example of this."[196]

Other Russian officials were quick to suggest that perhaps the origin of the plutonium seized might have been from England, Japan or even Germany itself. The director of the department of information and press for the Ministry of Foreign Affairs Mr. Grigorii Karasin stated that "Russia is open to international cooperation and interaction to nip the smuggling of radioactive material in the bud". but quickly added that the only factor which connects Russia to the plutonium seized at the Munich airport is the fact that the aircraft's point of origin was Russia.[197]

Operation Hades led to embarrassment for both the German BND and the Russian government, but despite the political casualties that were created in Germany, it did succeed in proving that bomb-grade plutonium could be smuggled out of Russia by a determined group, for a price.

The second view on the status of the nuclear black market presented by Mr. Lee in his article is that most of the "players in the visible black market are con artists, hucksters, and swindlers. And this may currently be the case. According to the German BKA, he says that "25 to 50 percent of commercial offers of nuclear materials are fraudulent." and that "there are few links between sellers and customers." Mr. Lee goes

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[195] Yevgeni Mikerin, Vice Minister of Atomic Energy, "Pfeile gegen Rusland", Interview Der Spiegel, No. 17, 1995, p 32.

[196] "Der Bomben-Schwindel des BND", Der Spiegel, No. 15, 1995, 45.

[197] "Moskva Zhelaet Presech Kontrabandu Iadernogo Topliva". Segodnia, 17 August, 1994, 1.

on to state that "authorities in Russia and Central Europe are hard put to identify any buyers of stolen nuclear substances who were not undercover police, intelligence agents, or journalists searching for a story."[198]

I believe that, based on available information, this view accurately reflects what is currently known about the status of the development of the nuclear black market. This is evidenced by the fact that although verifiable incidents of fissile material smuggling have yet to be proven[199], there continues to be numerous scams involving such bogus materials as the nonexistent "explosive Red Mercury", or the rare Osmium-187[200] as well as radioactive gauges and equipment that attempt to swindle potential middlemen and buyers out of the potentially large profits that do present themselves on occasion.

This view that most of the nuclear smuggling that has been witnessed, consists of materials that do not pose a proliferation threat is echoed by the INTERDICT/RADICAD training program which is conducted by the Pacific Northwest National Laboratory in Richland Washington. The program, which trains foreign border control agents and border security personnel in the interdiction and containment of the components of WMD places special emphasis on the identification of nuclear scams and swindles.[201]

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[198]Rensselaer Lee, "Smuggling update", Bulletin of the Atomic Scientists, Vol. 53, No. 3, May/June 1997.

[199] NDU, Strategic Assessment 1998 Engaging Power for Peace, 211.

[200] Dr. Charles E. Willingham, Senior Research Scientist Pacific Northwest National Laboratory, "Scams", Briefing for foreign Customs and Border Control agents at the INTERDICT/RADACAD training program, HAMMER Training Center, Richland Washington.

[201] "Scams", Briefing for foreign Customs and Border Control agents at PNNL's INTERDICT/RADACAD training program, HAMMER Training Center, Richland Washington.

The third group of followers of the black market issue believe that there might even be an entire underground network already in place and being run by a combination of organized crime and corrupt plant managers.[202]

And yet there is now a fourth group that believes that all of this may be only a precursor of what is to come. In fact Mr. Lee points out that in 1996, the National Defense University suggested that "current patterns of nuclear theft and smuggling may be a prelude to more serious episodes, including major covert exports of fissile material, weapons components, and even intact nuclear weapons."[203]

I would submit that the three "camps" outlined by Mr. Lee are not camps at all but are actually phases in the development of a nascent nuclear black market that are occurring sequentially and will be discussed in greater detail in the conclusion.

As stated earlier, the actual status of the nuclear black market remains (as is the case with all black markets) relatively unknown. But I believe that by continuing to monitor the known facts such as the underlying economic, cultural and political conditions in Russia and the other nuclear successor states of the Soviet Union we can perhaps be able to better evaluate the development of a nuclear black market.

In Chapter 4 we established that there is a demand for fissile material. Here in Chapter 5 we have seen examples of how a supply of fissile material could be established to meet that market demand.

But in closing this chapter on attempts to establish a supply of fissile material for the black market, we must also consider that the possibility exists that some, as yet

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[202] Rensselaer Lee, "Smuggling update", Bulletin of the Atomic Scientists, Vol. 53, No. 3, May/June 1997.

[203] James L. Ford and C. Richard Schuller, "Nuclear Smuggling Pathways: A Holistic Perspective (Washington DC, National Defense University, 1996), 7, as quoted in Rensselaer Lee, "Smuggling update", Bulletin of the Atomic Scientists, (Educational Foundation for Nuclear Science) Vol. 53, No. 3, May/June 1997, 11-14.

unknown attempts, have not failed and that such a supply has been established and may be in storage awaiting a buyer. As shown in the example of Adolf Jackle in Tengen, Germany, his fissile material supply was found "by accident"[204]. Had he not been suspected of counterfeiting in a totally unrelated case, and if the two remaining factors of Ullman's Triad, Transferability and Lack of Intervening Opportunity, could be overcome, trade would have occurred – not trade in legitimate goods and material, but in kilotons of explosive force.

[204] Graham T. Allison, Owen R. Cote, Jr., Richard A. Falkenrath and Steven E. Miller, Avoiding Nuclear Anarchy: Containing the Threat of Loose Russian Nuclear Weapons and Fissile Material, CSIA Studies in International Security No 12, (Cambridge, Massachusetts, The MIT Press 1996) 27.

CHAPTER 7: INTERVENING OPPORTUNITY

In this chapter, I will discuss the concept of intervening opportunity, or rival sources of supply, and the effects it can have on the choices that must be made by those with a demand for fissile material.

As with all illegal commodities, the sources of fissile material will tend to be narrower and fewer than all other illegally trade goods, and the fact that intervening opportunities for the sale of fissile material have not yet presented themselves, means that the focus of attention on such trade should clearly be directed at the Former Soviet Union.

As explained in Ullman's Triad, complementarity can be established "between two areas [or groups] only if no intervening, complementary source of supply is available."[205] If an intervening opportunity for fissile material presents itself, and the problems of transferability can be overcome, then this will lead the group with the demand to choose the new group or area with the desired supply. In short, "intervening opportunity leads to a substitution of areas."[206]

The potential availability of intervening opportunity sources outside of the FSU that may present themselves to prospective buyers of fissile material eager to advance their capabilities up the Hierarchy of Terror are, today, almost nil. This is due, in large part, to the small number of countries who actually possess fissile material, and the fact that most of the governments of these countries are currently signatories to various non-proliferation conventions, such as the NPT mentioned in Chapter 4. In addition, they are

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[205] Edward L. Ullman, Geography as Spatial Interaction, (Seattle, University of Washington Press, 1980) 16.

[206] Peter Haggett, GEOGRAPHY: A MODERN SYNTHESIS, (New York, Harper and Row, Publishers, 1972) 325.

in relatively stable financial and political situations with intact security regimes and therefore, one would initially preclude thinking of them as potential rival sources of supply for fissile material.

But what is important to remember is that less than ten years ago, in 1990, the communist government of the Soviet Union, with all its stringent and invasive security regimes, ruling one of the largest police states in the history of the world, was also thought to be stable. Could one or more countries from the current list of states possessing fissile material also become a potential source of fissile material in the future?

NUCLEAR WEAPON STATES

Prior to the detonation of the Indian and Pakistani nuclear devices, there were seven states that possessed nuclear weapons. Five of these states have openly integrated nuclear weapons into their military arsenals and doctrine, and are therefore referred to as "overt nuclear weapon states"[207]. Currently, they are:

- The United States
- Great Britain
- France
- China
- The Russian Federation

[207] Definition provided by Ambassador Thomas Graham, Jr., Interview, 21 January, 1999.

South Africa was also one of the seven original nuclear weapon states, but has since given-up it's nuclear status and joined the NPT. It now voluntarily submits its supply of fissile material to IAEA inspection[208].

ISRAEL – THE SEVENTH STATE?

Israel is the seventh state "known" to possess nuclear weapons but which has repeatedly denied possessing a nuclear arsenal. During the Johnson administration of the late 1960's, it was the administration's fervent desire to bring Israel into the NPT as a non-nuclear weapons state. But that was not to be the case. Israel, long a target of wars and terrorism, wanted to maintain the flexibility to respond to threats to its security with all means at its disposal yet continued to promise, in the words of Lev Eshkol, Israel's third prime minister, that "Israel will not be the first to introduce nuclear weapons into the Middle East."[209]

As Mike Moore highlights in his review of the book Israel and the Bomb by Avner Cohen (referred to as a "scholarly treatise [of Israel's pursuit of the bomb] that includes over 1200 footnotes") "although everyone "knows" that Israel has a nuclear deterrent, goes the conventional wisdom, the failure to proclaim it publicly means that Arab leaders are not backed into corners and forced to pursue their own bomb programs."[210]

According to Moore, this refusal to admit possessing nuclear weapons "has enormously complicated US-Israeli relations over the decades." Moore cites a passage from Cohen's book in his review which I believe illuminates what could be a

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[208] Ambassador Thomas Graham, Jr., Interview, 21 January, 1999.

[209] Mike Moore, review of Israel and the bomb, by Avner Cohen, Columbia University Press, 1998, in The bulletin of the Atomic Scientists, Jan/Feb 99, p 74,75.

[210] Moore, 75.

destabilizing factor in the desire to maintain future stability in the Middle East and is presented below:

> "At one point in November 1968, Paul Warnke, then an assistant secretary of defense for international security had an extraordinarily frustrating exchange with Yitzhak Rabin, then Israel's ambassador to the United States: The problem, said Warnke, was that the US could not quite figure out what Israel meant by saying it would "not be the first to introduce nuclear weapons in the area."
>
> "It means what we have said," said Rabin in diplomatic doublespeak, "namely, that we would not be the first to introduce nuclear weapons."
>
> "But", asked Warnke, "what specifically did "introduce" mean?
>
> "You are more familiar with these things than we are," Rabin replied. "What is your definition of nuclear weapons?"
>
> "If a nation had components that could be assembled to make a nuclear weapon, that was a nuclear weapon", said Warnke.

["As to the meaning of "introduction"-points-out Moore, "that was an Israeli term and the Israelis would have to define it".]

> "Do you consider a nuclear weapon one that has not been tested, and has been done by a country without previous experience? asked Rabin.
>
> "Certainly," said Warnke.
>
> "But all the existing nuclear powers, protested Rabin, had tested nuclear weapons". "Do you really believe introduction comes before testing?"

And so, according to Moore, the Israelis believed that as long as they did not test their weapons, they had not "introduced" them; they could maintain plausible deniability, they had preserved nuclear ambiguity.

Unfortunately this plausible deniability, which the United States has had to accept and even stand-up and defend against the protestations from allied Arab leaders is, as Moore points out "a double standard." What this double standard really means, according to Moore, is that "it is okay for Israel to possess a nuclear arsenal, possibly numbering in the low hundreds; but it is not okay for an Arab nation to have so much as one nuclear weapon". But as we shall see, the nuclear ambiguity loop-hole may be used by Arab states as well.

PAKISTAN: INTERVENING OPPORTUNITY CANDIDATE ON THE HORIZON?

We now know that India has made the decision to openly integrate nuclear weapons into her arsenal,[211] bringing the official number of overt nuclear weapon states up to six. One very real concern pointed-out by Ambassador Graham which could lead to the development of an intervening opportunity for fissile material outside of the FSU, is the potential nuclear arms race that could develop between India and Pakistan on the sub-continent. Although both countries have tested nuclear devices, the decision by India to integrate nuclear weapons into her arsenal may force Pakistan, which to date has not made such a decision, to try to keep pace with her neighbor and could run the risk of collapsing an already fragile Pakistani economy. Such a potential collapse could invite countries such as Iran, Nigeria, Libya, Saudi Arabia and Egypt to offer to bail the Pakistani economy out, in exchange for the sale or transfer of nuclear weapons, fissile material, technology or scientific assistance. Thus Pakistan could become an intervening

[211] Ambassador Thomas Graham, Jr., Interview, 21 January, 1999.

opportunity to states and groups with a demand for nuclear weapons[212] as it strives to keep pace with its arch-rival India.

For countries and terrorist groups considering the possible pursuit of the nuclear option, especially Moslem countries such as Iran, Nigeria, Libya, Saudi Arabia and Egypt (terrorist groups might find help in meeting their goals through either Libya and Iran, both known to be sponsors of terrorist organizations in the past), the choice between choosing to openly bail-out an economically weakened Moslem brother-in-need like Pakistan in exchange for nuclear favors, verses trying to overcome the obstacles to clandestinely or illegally obtain nuclear materials from an FSU black market, might indeed be a tempting one.

The grudging acceptance by the Western democracies of Israel's nuclear ambiguity as described above could now come back to haunt the stability of the Middle East if Moslem states ever come to possess nuclear weapons or weapons technology from Pakistan or the FSU. For as long as they do not "test" their new weapons (remember that the Uranium-Gun bomb design used by the United States for the "Little Boy" bomb dropped on Hiroshima was fool-proof and required absolutely no explosive testing, and that this is also the same design used by both the South Africans and the Israelis for their weapons), the Moslem states can also claim the moral high-ground by not being the first "to introduce nuclear weapons into the Middle East." This willingness to rely on political double-speak and plausible deniability could destabilize the status quo by rendering the historically volatile Middle East an area full of "non-existent" nuclear weapons.

CHINA, A SECOND INTERVENING OPPORTUNITY CANDIDATE?

Since the fall of the Soviet Union, the Chinese have been using their hard currency to purchase sophisticated military hardware from Russian. According to a

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[212] Ambassador Thomas Graham, Jr., Interview, 21 January, 1999.

United States General Accounting Office Report, Russia agreed to supply China with Su-27 Flankers, Su-31 trainers, MiG-31 Foxhounds, Tu-22M Backfire medium- range bombers, T-72 tanks, S300 surface-to-air missiles, and IL-76M Candid transports. Moreover, four Kilo class submarines have been delivered, and talks are underway for Beijing to purchase 22 more[213].

It would appear that China is currently attempting to develop the military capability to assume a potential hegemonic role as the dominant military power in Asia. According to a report delivered at the U.S. Army Strategic Studies Institute, Carlisle Barracks, Pennsylvania in 1996:

> "China's active duty military, at 2.9 million personnel, is the largest military force in the world. Numerically, the Chinese navy ranks third in the world. Many Chinese warships are equipped with outdated weapons systems, but some are known to be of "1980 vintage," equipped with surface-to-surface and surface-to-air missiles and reasonably capable defense systems. China has long lacked military projection capabilities for its navy and air force, but it is clear that Russia is slowly providing the technology and modern equipment to advance Chinese power projection"[214].

This Russo-Chinese military cooperation with regard to weapons sales could very well be viewed as a potential threat to the current status-quo of Asia. The potential for Chinese expansionism has, in the past, proven to be a problem. The long-standing dispute

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[213] General Accounting Office (GAO) ,"National Security: Impact of China's Military Modernization in the Pacific Region", GAO/NSIAD-95-84, June 1995, pp. 19-21.

[214] William J. Taylor, Jr. and Abraham Kim, Dianne L. Smith, Ed., "Part II China: A Central Player's Rapprochement with Russia", ASIAN SECURITY TO THE YEAR 2000, U.S. Army Strategic Studies Institute, Carlisle Barracks, Pa., 1996 p.2.

over the status of Taiwan and the ongoing, and as yet unanswered question about the Spratley Islands, are but two current examples.

In addition, China has continued to work quietly to develop its nuclear capability, and its continued reliance on espionage in the heart of the United States nuclear weapons industry[215] has netted itself the plans for the W88 nuclear warhead from the Los Alamos national laboratory in New Mexico. The theft of the W88 plans (the W88 is one of the smallest warheads in the U.S. arsenal and can be fitted to small covert missiles) has cut fifteen years off of their nuclear weapons program[216] and has been decried by many in both the United States House and Senate who have begun to question both the Clinton Administration and Chinese motives and desires.[217] This act of espionage, referred to by U.S. officials as "the most egregious case of Chinese espionage at the labs,"[218] has cast Chinese military and political motivations in a new light.

China, like the other four original overt nuclear states, has been in a position to serve as an intervening opportunity to rogue states and groups looking to obtain fissile material to pursue a nuclear option. But perhaps due to a desire to limit the spread of such weapons in order to maintain peace. Or perhaps due to the fear that such a fissile leak during the height of the Cold War and the subsequent detonation of a terrorist device on US or NATO soil would point directly back to either China or the Soviet Union as the perpetrator. With the hair-trigger status of the superpowers, such an attack would most assuredly have resulted in retaliation against both communist countries. Therefore, such

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[215] Eric Wagner, "Stolen Secrets", ABCNEWS.COM, 9 March, 1999. http://abcnews.go.com/sections/world/DailyNews/chinanuclear_wagner.html

[216] Eric Wagner, "Stolen Secrets", ABCNEWS.COM, 9 March, 1999.

[217] See "The China Syndrome", ABCNEWS.COM. http://abcnews.go.com/sections/world/DailyNews/china_thisweek980315.html

[218] Eric Wagner, "Stolen Secrets", ABCNEWS.COM, 9 March, 1999.

musings during the Cold War were unthinkable. However times have changed and the hair-trigger alert status maintained by the superpowers has been reduced.

Therefore, given the inability to currently trace fissile material back to its source,[219] and the increasingly distrustful atmosphere between Communist China and the United States, coupled with a potentially unstable future situation with regard to the security of the FSU fissile stockpile, China, while maintaining plausible deniability, could decide to serve as a temporary intervening opportunity to those groups in search of weapons-grade material-if the target goals of such a group also serve the strategic and political interests of China. Tomorrow, a terrorist detonation on U.S. or NATO soil, despite heightened tensions between the U.S. and China, would definitely leave open the arguable and very real possibility that the fissile material used in such a terrorist device may have been successfully smuggled from one of the nuclear successor states of the Soviet Union[220].

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[219] See Mark Hibbs, "Nuclear Smuggling: Which fissile fingerprint?", The Bulletin of the Atomic Scientists, May/June, 1995.

www.bullatomsci.org

[220] The plausibility of such a scenario was confirmed during a discussion at the University of Washington on 12 March, 1999, between the author and Dr. James L. Fuller, Ph.D. who serves as the Director for the Pacific Northwest Center for Global Security which is operated by Battelle for the U.S. Department of Energy.

CHAPTER 8: TRANSFERABILITY

According to Dr. Ullman, the final factor required in a system of trade between two entities is Transferability, or the ability to overcome the distance between entities [one with a supply and one with a demand] which is measured in real-transfer costs [canal/railroad/road construction and associated vehicles etc.] or time costs [How fast can the product be sent to market etc.].[221]

In describing the effects of transferability on the spatial interaction of trade Dr. Ullman brought up several characteristics, conditions and effects that would affect transferability; Two characteristics of interaction: direction and length of haul. Some conditioning factors: type of commodity and political sovereignty. And the effects of increased interaction on areal differentiation.[222]

The conditioning factor that has most affected the transferability of fissile material is that of political sovereignty, more specifically its assumed sub-component legality . Dr. Ullman stated that "few influences have been greater in distorting spatial interaction than political control of areas and the consequent channeling of trade and interaction measurements. This is so well known as to need little amplification."[223] The fact that trade in a forbidden commodity is illegal also serves to distort the spatial interaction of trade for anyone who still desires to trade in that commodity. This distortion takes the form of border security efforts and inspections to name but a few of the techniques used, all of which are designed to interdict the illegal trade flow once it has entered a smuggling pipeline.

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[221] Edward L. Ullman, Geography as Spatial Interaction, (Seattle, University of Washington Press, 1980), 16-18.

[222] Ullman, 22.

[223] Ullman, 24.

Dr. Ullman illustrated his point with the fact that Spain's political control of the new lands of America required the British, if they wanted to trade with Buenos Aires, to follow prescribed trading routes which took the British first to Spain and then across the Atlantic to Panama and then down the Andes coast line to Argentina. Rather than follow this trading route [and obviously to avoid paying the transit fees required at each point along the route], the British decided to avoid this distorted route and instead develop a more streamlined process to deliver their goods. They choose an illegal method to meet the demand and smuggled their goods directly into Buenos Aires from the sea.[224]

The fact that trade in fissile material is illegal, has also distorted the spatial interaction of trade between the potential supplier of FSU fissile material and the potential terrorist groups with a demand for a nuclear WMD., This has led to the development of streamlining process, in the form of secure smuggling routes and new techniques of hiding the commodity to overcome the distortions (read blockades) to trade.

In this chapter I will present information which will highlight this streamlining effort focusing on the physical characteristics of the commodity (HEU and plutonium), and the ease with which it can be hidden, as well as physical transport concerns and both confirmed routes and potential routes to market that may be available in the future. This will be followed by the role organized crime may play in the streamlining of the process. All of which affect the possibility that fissile material can bypass the obstacles brought on by its illegal nature and succeed in moving it from point of supply to point of demand.

Finally it is important to note that commodities that prove to be too difficult to transfer due to a variety of reasons will lead the buyer to a substitution of product in the same way that intervening opportunity leads the buyer to a substitution of areas[225] and so

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[224] Ullman, 25.

[225] Peter Haggett, GEOGRAPHY: A MODERN SYNTHESIS, (New York, Harper and Row, Publishers, 1972) 325.

I will present information on the potential product substitutions that a terrorist group may choose to meet its demands for a WMD.

PHYSICAL CHARACTERISTICS OF HEU AND PLUTONIUM AND ITS EASE OF TRANSPORT

HEU and plutonium was produced in several different forms during the Soviet period, from completed spheres referred to as plutonium buttons, to fuel pellets, wafers and extruded bars[226]. The material will be very dense and somewhat heavy to carry, but these forms, lend themselves to easy concealability in such everyday things like backpacks, suitcases and other such containers. As an example, the plutonium "pit" used for the implosion design of the "Fat Man" bomb was a sphere that was the size of a small orange and only measured 3.2 inches across and weighed about eleven pounds.[227] Such a small package could easily be taken from a storage site inside a book bag, yet this small package, once weaponized, had the destructive equivalent of 22,000 tons of TNT[228].

During my interviews of senior personnel at the Pacific Northwest National Laboratories (PNNL) in Richland Washington, I was shown a simulated "pit" of HEU the size of a large Grapefruit, this silver-colored "pit" weighed, in my estimation, close to seventy pounds[229] and although heavy, could still be concealed and carried by a man with a backpack. Such smuggled material can also be placed inside drums of diesel fuel or oil, or inside bees wax, as was the case for smuggled heroin from Mexico into the United States. One of the latest techniques for smuggling described to me at PNNL was the

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[226] PNNL personal interviews by author, 5 & 6 April, 1999.

[227] Rhodes, 655.

[228] Robert Del Tredici, At Work In The Fields Of The Bomb, (New York, Harper & Row Publishers, 1987),iv.

[229] Demonstration by Dr. William C. Cliff, Ph.D., Manager, International Border Security National Security Division, Pacific Northwest National Laboratory, Richland, WA. 5 April, 1999.

insertion of a solid smuggled item into a tar bucket that is used by roofers. A truck loaded with a hundred of these buckets, which are actually cylinders of solid tar, would present the border control agents with a problem since it would be difficult to inspect fully all 100. At some border crossings such as the one in San Diego, California, when a tar truck arrives, one or two of the solid cylinders is randomly selected and dropped from the roof to crack it open on the pavement, allowing inspectors to verify that nothing is being smuggled inside it.

Plutonium powder is also another form that fissile material can take and is often stored neatly in small "milk" cans at sites such as Krasnoyarsk-26 which are easily carried with one hand by the workers on duty.[230] Such powder can be mixed with soap or other powders and transported to its destination where it could be separated under running water.

In another example of commodity forms and their ease of transport, Ambassador Thomas Graham, Jr., former Special Representative of the President for Arms Control, Non-proliferation, and Disarmament under President Clinton related, during an interview that employees who work at one particular storage site would routinely slip several HEU wafers into their coat pockets as they left the HEU containment rooms at the end of their work day and simply walk out[231]. Finally, in testimony before the Senate in 1996 on the topic of WMD, then director of the CIA, John Deutch, when ask how easy it would be to smuggle the hocky-puck-sized plutonium elements needed to build an improvised nuclear device replied "you could take a briefcase and put in a couple of them and pass through a

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[230] PNNL interviews 5 & 6 April, 1999.

[231] Ambassador Thomas Graham, Jr., President of the Lawyers Alliance For World Security (LAWS), interviewed by author, 21 January, 1999, Seattle, tape recording, University of Washington, Seattle.

border. Unless there was specific detection equipment and devices, or some other inspection schemes, I would think it would be pretty easy".[232]

One of the many myths surrounding various types of fissile material is the belief that it is dangerous to handle and transport. Many people believe that the act of simply coming in contact with fissile material will lead to radiation poisoning and death and subsequently believe that trying to smuggle fissile material would be an instant death sentence for anyone foolish enough to attempt such a venture. This is a pernicious belief echoed by the authors of *Avoiding Nuclear Anarchy: Containing the Threat of Loose Russian Nuclear weapons and Fissile Material,* who remind us that "HEU is hardly radioactive at all."[233]

This fact was also confirmed during interviews with Dr. William C. Cliff, Ph.D., Manager, International Border Security National Security Division, at the Pacific Northwest National Laboratory (PNNL) in Richland Washington[234]. Some forms of fissile material, such as spent reactor fuel rods, if unshielded, will cause radiation poisoning, however the plutonium "pits" from the FSU stockpile of discarded nuclear weapons are often encased in beryllium or other metals and the radiation that is given-off by these "pits" is measured as Alpha-ray radiation, which cannot penetrate clothing or even skin[235].

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[232] CIA director John Deutch answering Senator Levin during hearings of the Permanent Investigations Subcommittee of the Senate Governmental Affairs Committee on the subject of Weapons of Mass Destruction, 20 March 1996.

[233] Allison, 12.

[234] Interviews with Dr. William C. Cliff, Ph.D., Manager, International Border Security National Security Division, at the Pacific Northwest National Laboratory (PNNL) in Richland Washington by author on 5 and 6 April, 1999.

[235] Allison, 12.

The fact that physically transporting HEU and/or plutonium is not hazardous to health is well known to those who work with it and to the middlemen who would offer it up on the black market.

A final factor that makes the physical ease of transporting an HEU or plutonium pit more of a threat to the U.S. is the grim fact that such items in whatever form they come in could be placed in a lead-lined box and stored among the legitimate cargo found in one of the thousands of 20-foot and 40-foot shipping containers that enter our country each and every day at ports from New York to Seattle. Only a small portion, " less than 3% of the 9 million large shipping containers entering the United States annually is checked by U.S. Customs"[236] according to the NDU's 1998 Strategic Assessment.

CONFIRMED CORRIDORS TO MARKET

Unlike legal trade, the corridors to market for smuggled fissile material are not easily identified. As a matter of fact, smuggling corridors that are successful will remain hidden from authorities and others seeking to stem the trade flow of fissile material smuggling. But by looking at the incidents of smuggling that have been intercepted, we can analyze where these previous attempts have been made and which routes were used. By using a simple process of elimination we can remove routes where the smuggler has been caught, and thereby possibly extrapolate where the successful routes are or may be in the future.

The first step is to identify the routes that have been used by fissile material smugglers in the past. This is done by gathering information from all previous seizures of smugglers that have occurred from 1991 - 1996. Based on an analysis of this data, the Center for Strategic and International Studies in Washington DC was able to conclude in its report entitled: The Nuclear Black Market: Global Organized Crime Project, that

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[236] NDU, Strategic Assessment 1998 Projecting Power for Peace, 208.

"although the data is limited, the traffickers are using four routes from The FSU into Western Europe".[237]

These routes were identified as: From Russia/Belarus, through the Baltic states to Poland and Westward to final destination [in most cases the apprehension of the smuggler took place in one of the countries of Western Europe. This does not mean that Europe was their final destination]; From Russia/Ukraine, through Moldova and Romania to Western Europe or through Bulgaria to Turkey and then on to final destination; From Russia through Azerbaijan (and possibly also through Armenia and Georgia) to Turkey and then on to final destination; From Russia/Ukraine, through Slovakia to the Czech Republic or Hungary to Austria and on to final destination.[238]

These routes are depicted in figure 16. The origination point is represented by the radioactivity symbol which is located in Russia. Bear in mind that as stated earlier, there are nearly 100 locations which contain weapons-grade fissile material. The border control guard symbolizes the number of borders along a particular route that had to be successfully crossed before they reached Europe. This indicates a dangerous porosity in the borders of the FSU and Eastern Europe, as well as the countries of Western Europe.

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[237] William H. Webster, Project Chair, The Nuclear Black Market, Global Organized Crime Project, Center for Strategic and International Studies, 1996,13.

[238] Author Rensselaer W. Lee III echos this east to west flow using Central Europe citing Interpol and IAEA data in his book Smuggling Armageddon, (New York, St. Martin's Press, 1998), 22, 23, which "suggests that the main traffic flows [are] from Russia through Belarus or the Baltic states, to Poland, and from there to Central Europe." He also claims that the countries that appear to be the destination for sale are Germany, followed by Switzerland, Austria, and the Czech Republic.

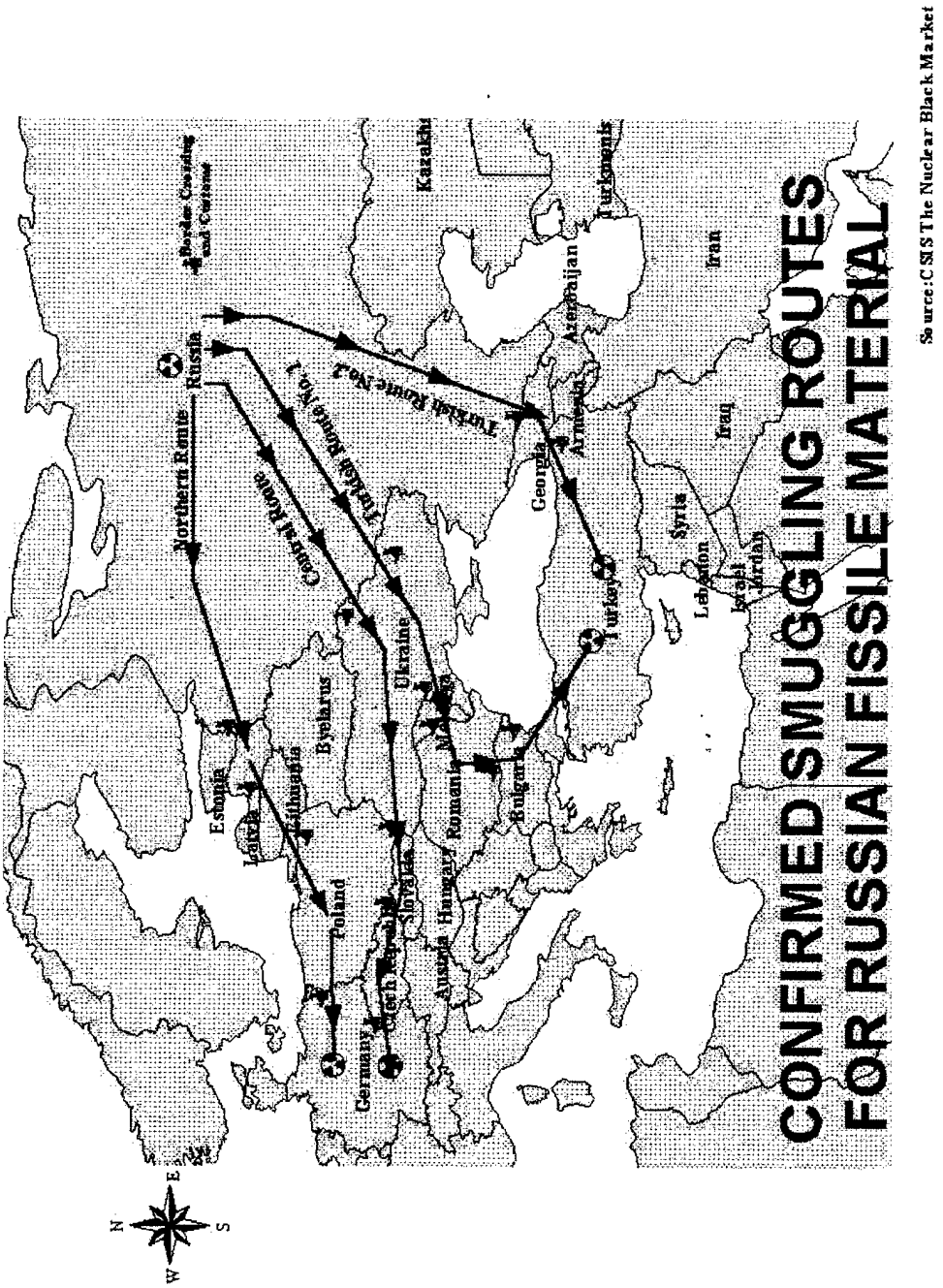

Figure 16 Confirmed Smuggling Routes For Russian Fissile Material

POTENTIAL CORRIDORS TO MARKET

By plotting these known smuggling routes on a map we can see that all but one choose to enter the West through Central Europe. What is obviously absent are routes that follow a southern path through the Central Asian states and head directly towards the location of the primary countries that are known to have a demand for nuclear weapons: Iraq, Iran, Syria and Libya. Also absent is a route heading east towards the Pacific ocean where the HEU and plutonium could be transferred to a waiting ship for transport to almost any destination, to include the Western United States.

Having eliminated the confirmed routes and identifying the potential buyers of fissile material and their locations we can extrapolate that the potentially successful trade routes are those where illegal activity has not been seen.

I submit that the following routes illustrated in figure 17, which focus on land shipments through the southern portions of the FSU as well as the sea route from the Russian Far East (RFE) may be the most successful for the smuggler of fissile material: Russia/Belarus/Ukraine through Kazakstan and Uzbekistan to Afghanistan and on to Iran; Russia/Belarus/Ukraine/Kazakstan to Azerbaijan and Armenia, through northern Iran and on to Iraq; Russia/Belarus/Ukraine/Kazakstan to Uzbekistan and Afghanistan to ports in Iran for shipment by sea to final destination; Vladivostok Russia across the Pacific directly to the Western coast of North, Latin, or South America and on to final destination.

Of course the lack of activity along these southern and eastern routes may also indicate that trade along these routes is non-existent. But since evidence to date, one way or the other, has not been made available it would be safe to assume that this lack of activity would suggest one of two things: These routes are the most secure smuggling

corridors due to porous borders and lax security, or these routes are devoid of smuggling activity.

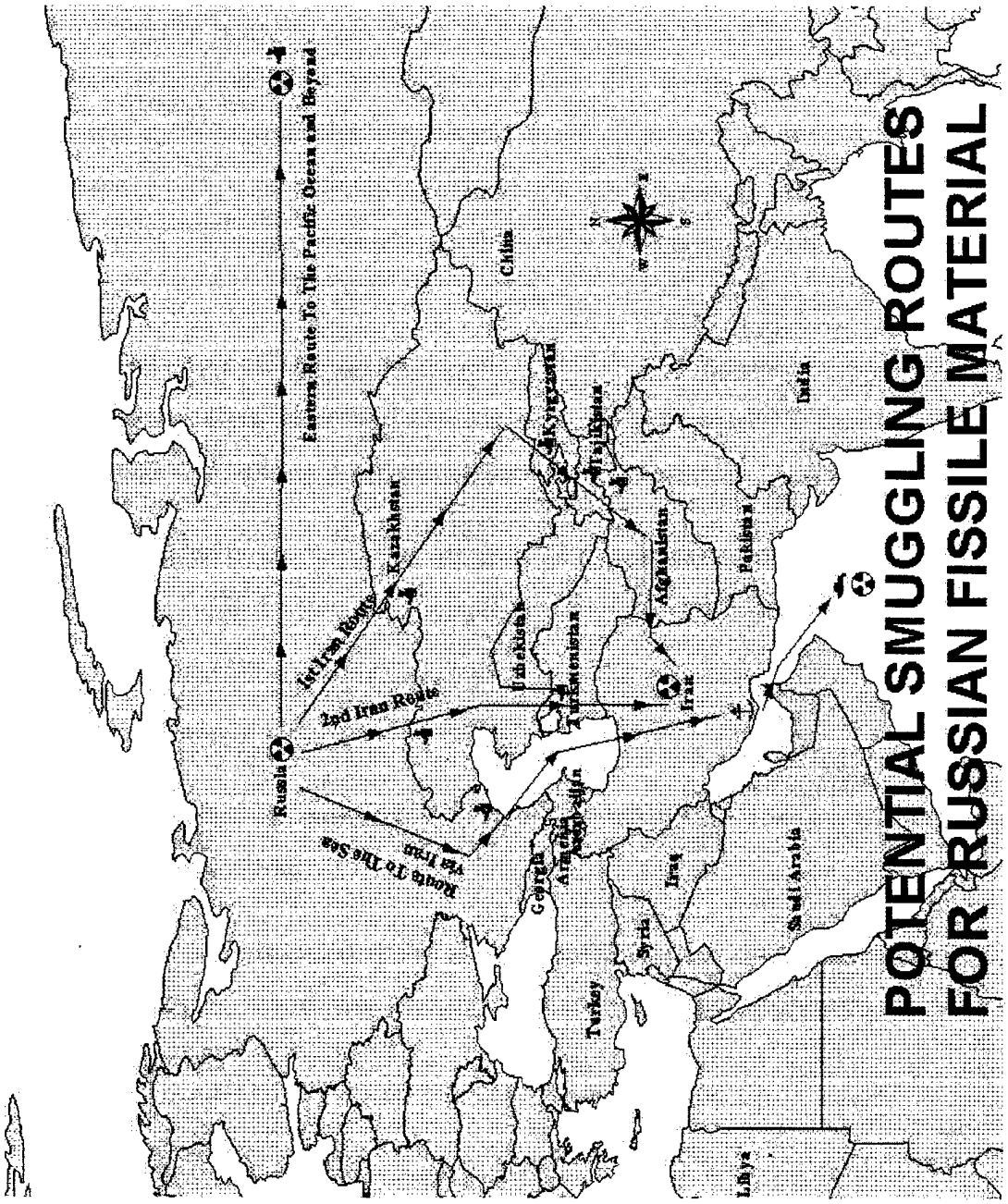

Figure 17 Potential Smuggling Routes For Russian Fissile Material

- Drugs and Weapons currently move across the borders of the Commonwealth of Independent States (CIS) without any special problems. What would keep nuclear material from also moving freely?[242]

- Potential involvement by experienced organized crime elements will increase the chances of success for any clandestine operation

This belief is considered plausible by Mr. David Kay, of Science Applications International Corporation who, during a discussion on potential buyers of fissile material told author Rensselaer W. Lee III that:

> "it is perfectly true, as Dr. Lee said, we cannot find in Western Europe many cases of North Korea, Iran, Iraq, or others buying. Quite frankly, I would be surprised if we did. You know, we have good German policemen on the German border with Poland. We do not have very many good German policemen on the southern routes of the former Soviet Union. There are well-developed smuggling routes. There are bastions of criminality in the south, which happens to be closer to Iran and closer to North Korea. There are other ways to get material out rather than coming through Germany. In fact, you would have to be rather stupid, quite frankly, as a smuggler to go through Germany."[243]

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[241] Interviews conducted with Johannes M. Funke, Kriminalrat, Bundeskriminalamt (BKA), at the George C. Marshall European Center for Security Studies Garmisch, Germany, May 1996.

[242] Vladimir Andreevich Orlov, Editor in Chief of the Journal Yaderny Kontrol, "Iadernii Shantazh: Ugrozy "Vnutrennikh Vragov" Nastorazhivaiut Bolshe, Chem Proiski Izvne", Nezavisimaia Gazeta, 29 August, 1997, 7.

[243] Conversation between Mr. Kay and Mr. Lee during a 1994 Washington DC conference on global organized crime. Renssalear W. Lee III, Smuggling Armageddon, (New York, St. Martin's Press, 1998) 25, 26

This belief is also considered plausible by the Center for Strategic and International Studies. In a report entitled: The Nuclear Black Market: Global Organized Crime Project they state that:

> "the many incidents in Western Europe may also reflect the fact that Europe's media and the law enforcement and intelligence services are effective. This suggests a frightening corollary – that smugglers using southern or eastern routes have succeeded in transporting nuclear weapons or materials across poorly protected borders into the Middle East and Asia where interested buyers might be located and law enforcement and intelligence services are less effective."[244]

If we assume that smugglers have been actively using these southern and eastern routes through both the Caucasus and Central Asia (which as been referred to as "the newest hub of the world narcotics trade."[245]), to smuggle various illicit goods, to include fissile material, then I would estimate that the potential for the use of a nuclear WMD within the borders of one of the Western democracies has just risen.

TRANSFERABILITY AND ORGANIZED CRIME

Organized crime elements with world-wide networks and vast experience have also become interested in the potential profits associated with the smuggling of nuclear materials. John Deutch, Director of the CIA stated in 1996 that "some 200 large, sophisticated Russian criminal organizations operating worldwide have established working relationships with international smuggling networks." He also stated that these organizations "have connections to government officials that could provide them with

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[244] William H. Webster, Project Chair, The Nuclear Black Market, Global Organized Crime Project, Center for Strategic and International Studies, 1996,14.

[245] Stephen Handelman, "The Russian Mafiya", Foreign Affairs, Vol. 73, No. 2, March/April, 1994, 83-96.

access to nuclear weapons or weapons-grade materials and enhance their ability to transport them out of the country."[246] Russian elements of organized crime are believed to be taking on roles as middle-men responsible for the actual transfer of the fissile materials and may even be serving as instigators of nuclear theft when potential buyers are found. Such participation in the transferability of fissile material will increase the potential danger to cities and countries that may become targets of nuclear terrorism.

According to Agent Johannes M. Funke, of the Bundeskriminalamt (BKA), Federal Republic of Germany, many of the initial smuggling attempts from Russia were perpetrated by ordinary people. Many of these people had no real criminal skills and were often their own worst enemy. But Europe and the rest of the world is now seeing more involvement by the organized crime elements in Russia who are using their expertise and networks to streamline the smuggle of everything from raw materials, weapons and narcotics to nuclear materials and human organs.

In addition Agent Funke stated that the continued growth of organized crime structures in Russia will lead to the development of parallel economic structures, one black or illegal, and one legal. Support for the development of these parallel economies will be obtained through the corruption of legal and government officials and organizations at all levels. This will result in the institutionalization of organized crime elements in various levels of government and will prohibit the effective prosecution of crimes such as nuclear theft if organized crime elements are involved. [247]

The potential for the development of these parallel economies and the subsequent corruption they will bring is already underway. According to Dr. Mark Galeotti, in his

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[246] William H. Webster, Project Chair, The Nuclear Black Market, Global Organized Crime Project, Center for Strategic and International Studies, 1996,1.

[247] Briefings conducted by Johannes M. Funke, Kriminalrat, Bundeskriminalamt (BKA), to students at the George C. Marshall European Center for Security Studies, Garmisch, Germany, May 1996.

article "*Russian organized crime*", since the fall of the FSU the five thousand-plus organized crime elements in Russia have been strengthening ties and building alliances of convenience with their Italian counterparts which has earned them the "franchise" to control organized crime activity in Germany and Northern Europe, as well as straining their relations with the Chinese Triads of Hong Kong and the Japanese Yakuza as they fight for control of the Russian Far East[248].

The development of world-wide organized crime elements will only serve to strengthen and streamline the smuggling process by using international connections, safe houses, couriers, and informants to insure that they are capable of delivering the smuggled item. No where is this more dangerous than in the countries of Central Asia. As described above, the Central Asian countries could serve as the conduit for the successful smuggling of HEU and plutonium from the FSU to rogue states such as Iran. The successful establishment of organized crime elements in organizations such as Kazak border control could lead to an even greater porosity in the borders of the Central Asian countries. Such a future is on the horizon as author Stephen Handelman points out in his article *The Russian Mafiya: Politics by other means*, he states that "Organized crime is the most explosive force to emerge from the wreckage of Soviet communism", and that the Central Asian republics, which form the southern periphery of the FSU, is being transformed by organized crime into "the newest hub of the world narcotics trade."[249]

This increase in the potential for world-wide organized crime activity was highlighted as a destabilizing factor to the global economy in the NDU's 1998 Strategic Assessment which pointed out that "the collapse of the Soviet empire and the reintroduction of capitalism in China have removed barriers not only to business but also

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[248] Dr. Mark Galeotti, "Russian Organized Crime," Jane's Intelligence Review, Vol. 7, No. 6, May, 1996, 195.

[249] Stephen Handelman, "The Russian Mafiya", Foreign Affairs, Vol. 73, No. 2, March/April, 1994, 83-96.

to criminal activities. New opportunities have allowed criminal organizations to globalize their operations, move into new markets, and expand the range of illegal activities."[250]

The U.S. Customs service recognizes the potential threats posed to US security by the "New International Criminal". Customs agents who assist in the training of foreign customs agents and border security personnel at the INTERDICT/RADACAD training program in Richland, Washington state that organized crime is "transnational in scale" and has the ability to "challenge national authority." These International Criminal Organizations (ICO) are "multinational" with large financial resources diversified into many ventures and employ a global work-force.

The increasing liberalization of travel restrictions within the FSU coupled with free trade and increased border porosity as well as the technological improvements in telecommunications allows the international criminal to create and manage their supply networks more effectively and efficiently[251]. This new ability strengthens their organizations and this growing strength leads to their increasing willingness to challenge authority and undermine the public's faith in government.[252]

The potentially increasing involvement of organized crime elements in the transferability issue of fissile material smuggling, coupled with their world-wide network of associates, safe-houses and smuggling routes and their combined international experiences in outwitting law enforcement agencies adds a new and more dangerous dimension to the threats posed by the smuggling of fissile material.

But if efforts to combat the new international criminal are successful, and law enforcement is able to stem the potential transfers of fissile materials then the potential

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[250] NDU, Strategic Assessment 1998 Projecting Power for Peace, 208.

[251] NDU, Strategic Assessment 1998 Projecting Power for Peace , 211.

[252] "The New International Criminal", U.S. Customs Service Briefing for foreign Customs and Border Control agents at the INTERDICT/RADACAD training program, HAMMER Training Center, Richland Washington.

danger to population centers once threatened by a nuclear WMD, may come, instead in other, quieter forms.

PRODUCT SUBSTITUTION AS THE ANSWER TO OVERCOMING THE PROBLEMS OF TRANSFERABILITY

Dr. Ullman explained the importance of transferability and how it relates to the concept of legal trade interaction between two entities, in this way: "If the distance between market and supply were too great and too costly to overcome, interaction will not take place in spite of perfect complementarity and lack of intervening opportunity. Alternate goods would be substituted where possible."[253]

This concept of product substitution applies to the illegal trade of fissile material between two entities in the same way. For example, A fundamentalist terrorist group has decided to seek-out a WMD for use against the United States and decides that a nuclear explosion will cause the greatest impact and provide the greatest chance for plausible denial. The group then makes contact with a Russian organization that has 10 kilograms of HEU to sell but over the course of time, they both see that they are unable to conduct the transfer due to their inability to overcome the superb efforts of local law enforcement and export control officials. Faced with this situation, interaction will not take place in spite of perfect complementarity.[254] And just as with legal substitutions, alternate goods will have to be substituted where possible to meet the WMD needs of the fundamentalist group.

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[253] William L. Thomas, Jr., Ed. ,Man's Role in Changing the Face of the Earth, (Chicago, The University of Chicago Press, 1956) 868.

[254] The hypothetical Iranian group would not have been presented with an intervening opportunity to purchase fissile material since potential intervening opportunities for fissile material have not surfaced to date.

Alternate WMD products available to terrorists and rogue states who seek a WMD weapon that can psychologically shake a target population and produce mass casualties include various types of chemical (CW) and biological weapons (BW). Today, if the dream of obtaining the ultimate shock weapon, a nuclear device, proves to be too difficult to obtain from the FSU, and no intervening opportunity, such as Pakistan or China is available to fill the gap, then a determined terrorist group or rogue state, unwilling to settle for the capabilities of conventional explosives, can be expected to continue their pursuit of a chemical or biological WMD as an alternative. A well-constructed chemical or biological weapon, although not capable of producing the same level of physical damage as a nuclear device, will still be able to produce mass casualties and inflict a tremendous psychological blow to the target.

BIOLOGICAL WEAPONS

In many ways the pursuit of a Biological WMD is much easier and cheaper than the path to a nuclear device and has already proven to be the locally produced substitute WMD chosen within the United States to overcome the problems presented by the obstacles that currently prevent the transfer of nuclear material.[255]

What is meant by the term biological weapon? Simply put, the definition of a biological weapon is

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[255] Discussions with FBI Special Agent Barry Tobin, WMD Coordinator for Seattle, on the choices a terrorist makes with regard to a WMD reveal that one reason American groups within the U.S. may want to use a biological WMD, as opposed to a nuclear WMD is the simple fact that once the weapon has been used, the group may still have to live in and around the targer area and therefore it makes no sense to turn it into a radioactive wasteland. But if the group is out in Montana, then using a nuclear WMD against Washington DC would not present that problem. A religious terrorist group from outside the U.S. would also have no such hinderance since their homes will not be affected. Interview by Max Gutierrez, 30 April, 1999, Office of the FBI, Seattle Washington.

> "a material of biological origin that can cause disease, harm or kill an adversaries military forces, general population, food crops and / or livestock. A BW can include any living microorganism or bioactive substance that is produced by a living organism that can be delivered to a target effectively."[256]

This material can include both living microorganism such as bacteria, viruses and fungi as well as non living agents such as bioactive chemicals derived from living organisms. And many, if not all of the necessary components to produce such weapons are available through the purchase of legitimate dual-use components.

According to an interview with Ms. Ann Jarrell, Clinical Laboratory Scientist (NCA), and Senior Technical Specialist of the Environmental Technology Division of the Pacific Northwest National Laboratory in Richland, Washington, a person with a Bachelor's Degree in micro biology would have the scientific knowledge to produce a basic Anthrax weapon. "Obtaining the base organism would be the trickiest part". She estimates that for under a hundred thousand dollars, the necessary equipment (such as a fermenter, lifalizer and safety hood) needed to produce such a weapon could be purchased.

Table 2, produced from information in Jane's Chem-Bio Handbook[257], illustrates some of the potential biological agents that could be used by a group or state, and their effects on a target population.

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[256] "Biological Agents and Weapons", Briefing for foreign Customs and Border Control agents at PNNL's INTERDICT/RADACAD training program, HAMMER Training Center, Richland Washington.

[257] Frederick R. Sidell, MD, William C. Patrick, III, Thomas R. Dashiell, Jane's Chem-Bio Handbook , (Alexandria Virginia, Jane's Information Group, 1998).

Table 2 Potential Terrorist Biological Weapon Agents

POTENTIAL BIOLOGICAL WEAPONS AND THEIR EFFECTS					
	Inhalation Anthrax	Pneumonic Plague	Ebola	Botulinum Toxin	Ricin
Method of Attack	Spores in aerosol	Aerosol	Aerosol	Aerosol or food/water contamination	Aerosol or food/water contamination
Incubation Period	1-5 Days	1-3 Days	4-16 Days	Hours to Days	Hours to Days
Duration of Illness	3-5 Days	1-6 Days	7-16 Days	24-72 Hours	10-12 Days
Lethality	High	High	High	High	High

The potential use of biological weapons is not a new phenomenon. Through out history biological weapons have been used as weapons of war. The following historical listing provided by Pacific Northwest National Laboratory INTERDICT/RADACAD Training program illustrates many of the numerous attempts to employ BW in combat[258]:

190 BC Hannibal hurled venomous snakes onto enemy ships; 1346 De Mussis observed the Tartars catapulting bubonic plague infected bodies into Kaffa (now

[258] "Biological Agents and Weapons", Briefing for foreign Customs and Border Control agents at PNNL's INTERDICT/RADACAD training program, HAMMER Training Center, Richland Washington.

Feodosia, Ukraine);1763 French and Indian War, blankets used by small pox victims were given to Native Americans to reduce their numbers; 1863-4 Civil War in America, troops placed diseased animal carcasses into wells and ponds to poison the enemy; 1914 World War I, Some aspects of biological warfare were attempted but the impact proved difficult to measure; 1941-5 World War II, Japanese use of cholera, dysentery, typhoid, plague and anthrax against the Chinese; 1950-60 Post-war development of biological warfare systems by both the U.S. and the Soviet Union (Although the United States ceased all biological warfare programs in 1969, the Soviet Union continued to maintain a healthy BW program buoyed-up by the belief that "Any new war will be characterized by mass use of air power, various types of rocket, atomic, thermonuclear, chemical and biological weapons".- Georgi Zhukov, 1956, to Communist Party Congress."); 1991 The Gulf War, Allies discover a BW weapons facility in Iraq containing 200 live missiles and bombs with anthrax, botulism and others.

The ability and willingness to employ biological weapons as seen here is well-documented and it is only a small leap of faith to believe that a terrorist group or rogue state would also be willing to use them against the population centers of their declared enemies, perhaps as an alternate to a nuclear WMD, or as their primary weapon of choice. For instance, a biological WMD would be the obvious choice for a group that had plans to occupy the target area once their goals were achieved.

An interview with Special Agent Barry Tobin, the FBI point-man responsible for the coordination of WMD issues for Seattle and the surrounding regions confirmed this belief and stated that a threat analysis conducted by the office of the Federal Bureau of Investigation[259], shows that, based on their likelihood verses impact analysis, the likelihood or threat posed by the use of a biological WMD in the United States is much higher than the current threat posed

[259] The FBI has been designated by Presidential Decision Directive 39 (PDD-39), U.S. Policy on Counterterrorism, June 21, 1995, to assume the role of lead federal agency for all operational responses to terrorist incidents within the United States.

by an improvised nuclear device (IND). Although the criteria used to arrive at this conclusion was undoubtedly classified, SA Tobin highlighted its results by explaining that there are numerous cases that regularly come-up with groups that are actively trying to develop biological weapons.[260]

And, according to information presented in Jane's Chem-Bio Handbook, the potential for a Biological WMD attack against an American city is real. Several "highly likely terrorists scenarios can be developed". This statement is based on a review by the Jane's staff of the "extensive vulnerability studies" that were conducted in the United States during the 1950s and 1960s.

One such scenario presented reveals that a graduate student using "readily available medium ingredients" could produce ten grams of a highly infectious incapacitating agent biological agent called Francisella tularensis (tularemia). The ten grams of dry agent could be inserted into standard light bulbs and then distributed on the subway tracks of any major city where the bulbs could be crushed by the passing train and the dry agent would be swept-up into the air to be spread through-out the tunnels and stations of the system.

This particular scenario was actually one of the cases tested during the vulnerability studies conducted during the 50s and 60s and the target city was New York. The test revealed that "riders on the subway at least 5 minutes would receive greater than ten human doses" and that over time "several hundred thousand subway riders would be affected"[261].

Although the New York example was only a test, the deadly effectiveness of bio weapons was inadvertently demonstrated in the former Soviet city of Sverdlovsk in 1979.

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[260] FBI Special Agent Barry Tobin, WMD Coordinator for Seattle, interview by Max Gutierrez, 30 April, 1999, Office of the FBI, Seattle Washington.

[261] Sidell, Jane's Chem-Bio Handbook, 250.

According to another case study in Jane's Chem-Bio Handbook, sixty-eight Russian civilians died when a suspected biological weapons production site released an Anthrax virus into the population. It is not known if this was an accidental release from the facility or a test, but most of the people who were exposed to the agent died despite treatment, and an undetermined number became ill. The Soviet government, however, attributed this incident and the subsequent deaths to "contaminated meat." [262]

CHEMICAL WEAPONS

A second alternate product available to terrorists or rogue states is the possible use of chemicals to create a WMD. Various chemicals have been used in the past as weapons against standing armies, as was the case during the First World War, as well as more recently during the Iran-Iraq war.

However, the March 1995 use of Sarin gas, a large casualty-producing nerve agent, in an attack directed specifically against the civilian population in Tokyo, took this possibility from the realm of the possible to the realm of the actual. This attack by the Aum Shinrikyo cult has now officially ushered in the first modern use of weapons from the WMD category of the Hierarchy of Terror presented in Chapter 2.

Sarin, however, is not the only chemical weapon that could be used. The variety chemical weapons category includes: Choking agents such as phosgene; Blood agents such as cyanogen chloride; Vomit agents such as adamsite; Incapacitating agents such as BZ and LSD; Blister agents such as mustard and lewisite; Nerve-agents such as tabun and soman; More complicated binary nerve agents like Sarin and VX.

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[262] Sidell, Jane's Chem-Bio Handbook, 249.

Many of the chemicals required to produce a chemical weapon are dual-use, that is to say, they have a legitimate civilian use. For example, one of the primary precursor chemicals, dimethyl methyl phosphonate (DMMP), which is required to create a nerve gas, is also found in flame retardants.

The United States government recognizes the significance of the breech into the upper-most category of terror on the Hierarchy, and has begun to rapidly establish programs to combat and react to terrorist biological and chemical attacks. One such program which was transmitted through out the United States on April 20-22, 1999 linked health care providers, government officials and first-response crews in an interactive satellite broadcast. The program, entitled "Medical Response To Chemical Terrorism," provided all attendees through out the United States with the same baseline information necessary to deal with a terrorist chemical attack[263].

Future terrorist or rogue state use of chemical weapons would require relatively small amounts of an agent to create the large numbers of casualties that would be associated with a WMD. According to Jane's Chem-Bio Handbook, "Most of the military-developed [chemical] artillery shells contain only six to fifteen pounds of nerve agent...These quantities can be produced relatively quickly and easily and only filling the dissemination device may produce a hazardous condition to the operators"[264].

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[263] "Chemical Attack Lessons", Army Times, 19 April, 1999, 2.

[264] Sidell, Jane's Chem-Bio Handbook, 152.

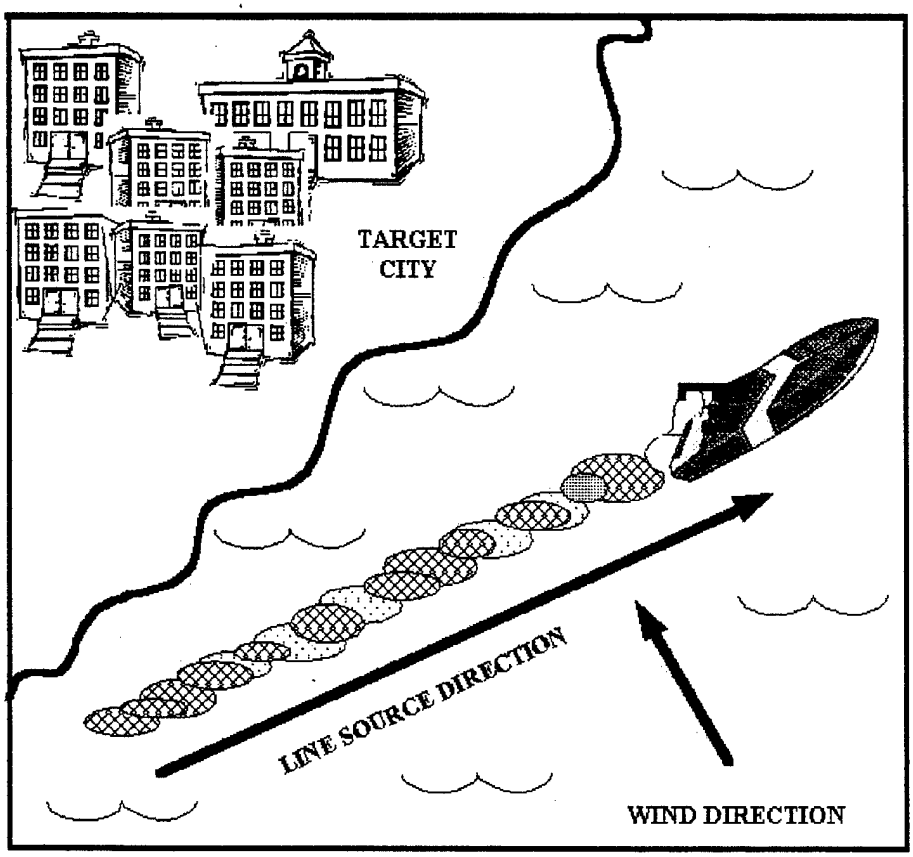

Figure 18 Improvised Chemical Dispersal Method

Once the agent is produced, the actual dispersion of a chemical WMD could be as sophisticated as a missile launched against a city by a rogue state, or as low-tech as a pick-up truck or small boat driven by a terrorist group with a commercially-available pesticide sprayer mounted on the back. A commercially available sprayer mounted on the back of a boat, for example could lay-down a line of chemical agent off the coast and allow the wind to carry it into a city. Fortunately there are numerous factors that a group planning to use such a weapon would have to contend with prior to executing such an

operation[265] such as temperature, humidity, precipitation, wind speed, wind direction and the nature of the buildings and the terrain within the target area must all be accounted for.

Since both chemical and biological agents are especially susceptible to weather conditions we can assume that such an attack would probably occur at twilight, in the evening or around dawn to maximize the effectiveness of the chemical or biological agent,[266] therefore, training by First-Responders and others who would be involved in combating such an attack should also be conducted at these times to understand fully the difficulties that will undoubtedly be encountered.

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[265] These factors are outlined in *Jane's Chem-Bio Handbook.*

[266] Sidell, Jane's Chem-Bio Handbook, 327.

CHAPTER 9: CONCLUSIONS

I submit that there are two nuclear threats to post-Cold War U.S. national security, and our level of concern should be framed around these potentialities:

- a proliferation threat posed by the developing perception in non-nuclear countries, of the political value of being a nuclear weapon state. This threat, as with the second threat below, is also fostered by the "at risk" stockpiles of fissile material in the FSU. Bear in mind, however, that states with the scientific wherewithal would probably have no need for FSU fissile material;

- the threat of physical attack against U.S. assets at home or abroad posed by the growing "at-risk" stockpiles of FSU fissile material and the potential that they may be smuggled into the hands of religion-based terrorists.

The first threat is an overt one caused by the perceived political value of possessing nuclear weapons by the current non-nuclear states. Ambassador Thomas Graham stated that if the political value of nuclear weapons was not reduced, and in light of the growing "at-risk" stockpiles in the FSU, "we can be assured that nuclear weapons will spread all over the world in the next 10, 15, 20 years. They will simply be too politically attractive to resist and the 1945-era technology is just too simple and they will be built and that will happen."[267]

The second, and I believe more menacing threat which has been the topic of my research, is the covert threat posed by the potential smuggling of fissile material from the nuclear successor states of the Soviet Union and its potential use at the hands of rogue states or foreign terrorist groups against American targets.

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[267] Ambassador Thomas Graham, Jr., Interview, 21 January, 1999.

THE DEVELOPING BLACK MARKET IN FSU FISSILE MATERIAL

In the previous chapters I have attempted to apply open-source information on the topic of fissile material smuggling to the framework of Ullman's Triad. In summary it is clear that: if a determined group within Russia comes into possession of a supply of fissile material or an actual nuclear weapon; and if a rogue state or terrorist organization can be found with a demand for a nuclear WMD, then complementarity will have been achieved. And if the obstacles blocking the illegal transfer of the fissile material can be overcome by the two potential traders, and no intervening opportunity, such as Pakistan or China offers the group desiring a nuclear WMD, a more easily obtained supply of fissile material, then trade between these two groups will occur.

From this effort it is clear that the potential is present to create the three factors required for trade in FSU fissile material. Of these three factors it would appear that the factors of complementarity and transferability are currently playing the key roles in the development of a nascent black market in FSU fissile material and, although the future of Pakistan and China remain unclear, it would be safe to assume that no intervening opportunity for fissile material purchase will become available in the near future. This means that all efforts to stem the flow of illegal fissile material should be directed towards the nuclear successor states of the Soviet Union.

Despite the claim that since 1997, "not a single case of stolen nuclear materials actually reaching a bona fide customer had been documented",[268] I am convinced that the interactions that have been presented here, within the framework of Ullman's Triad, specifically with regard to complementarity (supply and demand), indicate that we are witnessing the creation and growth of a nascent black market in FSU fissile material. I base this judgment on the fact that the information presented in chapter five strongly

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[268] National Defense University Institute for National Strategic Studies, Strategic Assessment 1998 Engaging Power For Peace, (Fort Lesley J. McNair, Washington DC, 1996), 211.

indicates a demand for fissile material by terrorist groups and rogue states, especially among terrorists from the religion-based camp. And that the examples of individuals willing to establish a supply by engaging in the theft of fissile materials from storage, described in chapter six is indicative of the lengths that workers in the nuclear infrastructure of the FSU will go to secure the well-being of their families during times of economic crisis.

The information presented in chapter eight with regard to the ease of fissile material transferability, coupled with the demonstrated interest that has been displayed by organized crime elements eager for high profits, reinforces my premise that a nascent black market is developing in three overlapping phases and that we have already seen indications that the market has proceeded from a first phase and may now be in the process of transitioning from the second into a third.

The first phase appears to have been characterized by the effects of supply-driven smuggling seen in the form of amateur smugglers attempting to sell fissile material to the West during the period immediately following the collapse of the Soviet Union. The actual cases were brought on in part, by workers and military personnel who were caught-up in the economic downturns their country was experiencing. Nuclear material, along with treasured icons, weapons and anything of value became a supply in search of a demand. Examples of this first phase were evidenced by the initial amateurish smuggling attempts of folks like Yuir Smirnov. These initial attempts, which resulted from lax security, fed and developed the terrorist demand for nuclear material by projecting the possibility that perhaps such material could be successfully smuggled out. This belief, in turn, led to offers of large sums of cash for the successful transfer of fissile material.

The second phase has been characterized by the creation of hundreds of unscrupulous sellers, swindlers and hucksters who recognize this increased demand and are trying to fill it by peddling anything that has a nuclear signature, such as medical isotopes, Red Mercury and Osmium-187, which is a naturally-occurring radioactive

substance previously used in phonographs and ball point pens.[269] This group, hoping to gain access to the potential profits but perhaps lacking the access to actual fissile materials, has tried instead to take advantage of the uninformed buyers.

But I suspect that although the indications appear to suggest that we are still in the second phase of this market's development, below this reality there are still determined and professional groups within Russia currently and systematically cultivating the appropriate personal who have legitimate access to fissile material. John Deutch, Director of the CIA stated in 1996 that "some 200 large, sophisticated Russian criminal organizations operating worldwide have established working relationships with international smuggling networks." He also stated that these organizations "have connections to government officials that could provide them with access to nuclear weapons or weapons-grade materials and enhance their ability to transport them out of the country."[270] These determined groups are also establishing and developing the transfer market connections that will be necessary to successfully smuggle the commodity out of the FSU. This fact is also recognized by Russians such as Vladimir Andreevich Orlov, the director of the Center for Political Research in Russia and the editor in chief of the Journal *Yadernyi Kontrol (Nuclear Control)* who points out in his in-depth article entitled "Nuclear Blackmail" that there has been a significant growth of international and domestic terrorist groups who have begun to work very well together and who are interested in obtaining state of the art weapons which can cause massive

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[269] Dr. William C. Cliff, Ph.D., Manager, International Border Security, National Security Division, Pacific Northwest National Laboratory, interview by Max F.X. Gutierrez, Jr., 10, 11 April, 1999, PNNL, Hanford Washington. Dr. Cliff provided information on the current fissile material scams being perpetrated as well as various smuggling techniques.

[270] William H. Webster, Project Chair, The Nuclear Black Market, Global Organized Crime Project, Center for Strategic and International Studies, 1996,1.

casualties on a population. According to Orlov, "all of this shifts the threat of nuclear terrorism to a practical plane".[271]

I therefore maintain that this third phase, fueled by the knowledge of the potential profits that will be received for a successful smuggling effort and characterized by the streamlining processes that eventually accompany the market commodification of any good or material, to include a viable transport/smuggling network, is currently in development. Terrorist groups, once they find out who will be the reliable sources of supply and transferability, will rapidly gravitate away from the swindlers. I suspect that once we begin measuring a marked decline in the number of bogus smuggling cases, this will serve as an indicator that the market demand has found an acceptable supplier who can also provide effective transfer of the commodity and a black market in FSU fissile material will have been established.

IS FISSILE MATERIAL SMUGGLING OCCURING?

Despite reports that state "no documented evidence" of fissile material transfers, we must remember that if a smuggling attempt is a success there may be no evidence - that is the standard of illicit smuggling success. If you steal something and no one catches you, you are a success.

Such worries of nuclear smuggling and lack of accountability have led to various efforts by both the international community and the Americans to help solidify the control and accountability of nuclear materials in the FSU, yet one of the most significant accounting problems facing the FSU and the international community is the question of exactly how much fissile material did the FSU actually produce? And how much of this material was illegally taken and may be waiting for a buyer?

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[271] Vladimir Andreevich Orlov, Editor in Chief of the Journal Yaderny Kontrol, "Iadernii Shantazh: Ugrozy "Vnutrennikh Vragov" Nastorazhivaiut Bolshe, Chem Proiski Izvne", Nezavisimaia Gazeta, 29 August, 1997, 6,7.

The Mayak storage facility being constructed near the town of Ozersk is tentatively scheduled to hold 40% of the weapons pits from the former Soviet strategic arsenal, but 40% of what total amount? [272] Without a base-line figure from which to work with, accounting for all of the potential bomb-making material that may be out there is a difficult proposition.

Scientific efforts are being made, however, at the Pacific Northwest National Laboratory in Richland Washington to develop a technique that could measure a reactor's residual radiation and be able to tell how much fissile material had been produced there. This process, known as nuclear archeology, could help to establish that unknown baseline, if it is allowed to be used in the FSU.[273]

As for the question of Russian officials actually documenting and quickly reporting to Western authorities, the embarrassing loss of one of their nuclear warheads from storage, or the theft by individuals and organized crime gangs of a 30 pound pit of plutonium 239 from already overwhelmed storage sites like Tomsk-7, where the plutonium pits were "piling up by the thousands,"[274] we must ask ourselves first if they still have the capability to accurately secure all of their nuclear weapons and track and account for the thousands of nuclear components that are surplus. This does not appear to be the case. In his book *Smuggling Armageddon*, author Renssalear Lee supports this assertion when he points out that "Managers of laboratories and other facilities that safeguard large quantities of weapons-usable uranium or plutonium often cannot quantify

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[272] Speech by Dr. James L. Fuller, Ph.D., Director, Pacific Northwest Center for Global Security, given at the University of Washington, 12 March, 1999.

[273] Speech by Dr. James L. Fuller, Ph.D., Director, Pacific Northwest Center for Global Security, given at the University of Washington, 12 March, 1999.

[274] Andrew and Leslie Cockburn, One Point Safe, (New York, Anchor Books, 1997), 42.

the nuclear material in their facilities, so they cannot conclusively determine whether any material is missing".[275]

However, if we ignore the fact that we are working without a baseline and assume that, despite budget cuts and dismal economic conditions, the Russian system of nuclear weapons security is still first-rate and that their ability to accurately track and account for the thousands of surplus plutonium and HEU pits is still intact and functioning, then we must honestly ask ourselves if we truly believe that the Russian government is going to freely come forward with actual documentation to prove that someone has breached their security and stolen one of their nuclear weapons or that someone has made-off with a 30 pound plutonium pit from a storage site in the Urals. To do so would lead to international embarrassment and might invite accusations from the West, fearful that the lost material might wind up as a bomb in the middle of New York or Bonn, that Russia is incapable of caring for its nuclear arsenal, and that perhaps Western governments on an international scale would suggest that the Russian nuclear complex should be placed under the watchful eye of an international watchdog organization such as the International Atomic Energy Agency (IAEA) which would "practically mean the end of Russia as a nuclear state".[276]

I believe that the government of the Russian Federation and all the Western governments, if they are not already, should be working together to combat what is probably a larger problem than what we currently see.[277] Perhaps in exchange for face-

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[275] Renssalear W Lee III, Smuggling Armageddon, (New York, St Martin's Press, 1998) 32, 33.

[276] This fear of the loss of autonomous control of their nuclear arsenal has been expressed by some senior Russian officials as reported in Vladimir Andreevich Orlov, Editor in Chief of the Journal Yaderny Kontrol, "Iadernii Shantazh: Ugrozy "Vnutrennikh Vragov" Nastorazhivaiut Bolshe, Chem Proiski Izvne", Nezavisimaia Gazeta, 29 August, 1997, 7.

[277] The United States continues to support a joint effort with the Russian government to combat the threat of nuclear smuggling, but the details of the cooperation remain

saving statements that tell the populations of the West that Russian nuclear security is functioning properly and by promises not to publicize nuclear weapon losses and failures in surplus fissile material accountability in the Western media, Russia might then feel more confident and may come forward sooner with its problem each time it occurs so as to allow law enforcement agencies and border control units more time to prepare and react. In addition to providing a face-saving measure to the Russian Federation, the purposeful secreting of the knowledge of nuclear theft also serves another more important purpose, providing the population with greater defense against a nuclear hoax. [278]

Therefore, despite the lack of "documented transfers" of smuggled amounts of fissile material from the FSU to a bona-fide customer,[279] and in the absence of a partnership similar in character to the one recommended above between the government of the Russian Federation and the Western governments, we should continue to monitor

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classified. During hearings before the Pemanent Investigations Subcommittee of the Senate Governmental Affairs Committee on Weapons of Mass Destruction on the 20th of March, 1996, then CIA director John Deutch, when pushed for details on this joint effort by Sen. Levin stated "that's not a subject that I want to discuss in open session."

[278] If a nuclear threat is phoned in to a city or government agency, certain procedures, as with all bomb threats, must be followed to insure that all the information that is available can be sent to the FBI. A city will then call in experts in nuclear weapons from the Department of Energy (DOE). Together, the FBI and the DOE would then evaluate the characteristics and motivations of the group making the threat. One of the critical factors will be to verify whether or not there has been a recent theft of the nuclear material described in the threat and evaluate the possibility that such a group might have actually come into possession of that material and if so, did they have a sufficient quantity? The various components that could make a threat more believable could be fabricated by a hoaxster, but if the hoax is timed to be submitted several days or weeks after the announcement in the Western media that Russia has lost some of its nuclear material, then the FBI/DOE assessment team may be forced to evaluate that threat at a higher level of probability, which could lead to unnecessary evacuations and the subsequent panic and fear that would follow. Briefing by Department of Energy, Weapons of Mass Destruction Counterterrorism Conference, 18-22 November, 1996, Virginia Beach Virginia and Tony Lesce, Wide Open to Terrorism, (Port Townsend, Washington, Loompanics Unlimited, 1996), 123.

[279] NDU, Strategic Assessment 1998 Engaging Power For Peace, 211.

the ever-changing situation in the FSU to forecast and identify what events and changes could cause an increase in fissile material smuggling.

COMBATTING THE THREAT

The federal government is taking a proactive stance with regard to the threats posed by WMD and the FBI and other agencies in response to Presidential Decision Directive 39, which calls for measures to "deter, defeat and respond to all terrorist attacks on our territory and resources, both people and facilities, where ever they occur,"[280] have already begun to establish plans of action and tracking systems to insure that the threat of WMD use on U.S. soil is never carried-out. Such actions include the addition of over 165 FBI Special Agents to work solely on WMD issues, and special surveys conducted in conjunction with the National Governors Association (NGA) that look at response capabilities to state-sponsored terrorist attacks as well as multi-agency assessments of the capability to respond to a WMD terrorist event.

OUR GREATEST THREAT – THE RELIGION-BASED TERRORIST

In determining who poses the greatest danger to U.S. security from out of the two camps of terrorists mentioned in chapter five, it is evident from the information presented that the greatest willingness to use a nuclear WMD, if one could be obtained, will be found primarily in the non-domestic, religion-based groups.[281]

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[280] Federal Emergency Management Agency, Unclassified PDD-39 Abstract, Washington, DC, 1.

[281] Discussions with FBI Special Agent Barry Tobin, WMD Coordinator for Seattle, on the choices a terrorist makes with regard to a WMD reveal that one reason American groups within the U.S. may want to use a biological WMD, as opposed to a nuclear WMD is the simple fact that once the weapon has been used, the group may still have to live in and around the targer area and therefore it makes no sense to turn it into a radioactive wasteland. But if the group is living out in Montana, then using a nuclear WMD against Washington DC would not present that problem. A religious terrorist

As author Bruce Hoffman states "The particular characteristics, justifications and mindset of religious and quasi-religious - as compared with secular – terrorists suggest that religious terrorists will be among the most likely of the potential categories of non-state perpetrators to use WMD."[282] We can therefore logically expect that these will be the primary terrorist groups seeking the fissile material to construct an improvised nuclear device. These are the same groups, according to Prime Minister Netanyahu, that are also prepared and ready to use "deliberate and systematic assault on civilians to inspire fear for political ends."[283] This willingness by a religion-based terrorist group to employ a Weapon of Mass Destruction, coupled with what Mr. Orlov described as the significant growth of international and domestic terrorist groups and who are interested in obtaining state of the art weapons which can cause massive casualties on a population "shifts the threat of nuclear terrorism to a practical plane".[284]

There is also another type of terrorists known as the "contract terrorists[285]" who can be hired by the religious-based terrorist or rogue state to carry-out an attack. As author Tony Lesce points out, this can be the result of one group trading favors with another group to throw local law enforcement off the trail as was the case in Israel when a Japanese terrorist group, doing a favor for an Arab group, attacked the Lod airport in

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group from outside the U.S. would definitely have no such hinderance since their homes and lands will not be affected. Interview by Max Gutierrez, 30 April, 1999, Office of the FBI, Seattle Washington.

[282] Hoffman, Inside Terrorism, 197.

[283] Prime Minister Netanyahu, 8.

[284] Vladimir Andreevich Orlov, Editor in Chief of the Journal Yaderny Kontrol, "Iadernii Shantazh: Ugrozy "Vnutrennikh Vragov" Nastorazhivaiut Bolshe, Chem Proiski Izvne", Nezavisimaia Gazeta, 29 August, 1997, 6,7.

[285] William H. Webster, Project Chair, The Nuclear Black Market, Global Organized Crime Project, Center for Strategic and International Studies, 1996, 16.

Israel or this may have been the case with the Libyan bombing of Pan-Am 103 which was, as some believe, seen as a contract terrorist job for Iran.[286]

A contract terrorist group, which could be either secular-based or religion-based, with a nuclear WMD acting on behalf of a religion-based group would also pose a threat to our security because such contract groups have a history of carrying-out their mission since the target area is not in their own back yard.

COUNTERTERRORISM

Regardless of their backing, religious or secular, most terrorist groups will possess some of the conviction necessary to see their attack through to the end with whatever technique they decide to use. To not do so would endanger the group by providing law enforcement agencies with the opportunity and time needed to possibly track them down through various law enforcement means and potentially end any chance by the group to actually carry-out their threat.

This willingness in the past to actually employ their conventional explosive weapons also stems from the knowledge that most countries and cities have adopted the precept that, although they will negotiate to buy time, ultimately there will be no giving-in to the demands of a hostage-taker or terrorist, consequently cities and countries alike have adopted policies to that effect and, if negotiations fail, are prepared to sacrifice the lone hostage to the gunman, and the plane-load of passengers to the terrorist group, rather than set a dangerous precedent.

But cities and countries have also spent a large sum of money to train and prepare police Special Weapons and Tactics (SWAT) teams, bomb disposal units and military special operations forces such as the United States Delta Force or the British SAS and

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[286] Tony Lesce, Wide Open to Terrorism, 22.

German GSG-9, to attempt to overwhelm and capture or kill the terrorist or hostage-takers or to deactivate the bomb when the situation presents itself.

To combat the threat of a terrorist nuclear WMD, the United States government created NEST, the special Nuclear Emergency Search Team, established in 1975 as part of the DOE and based in Nevada. NEST is trained to search for and deactivate or contain a terrorist nuclear device.

An ABC television program aired several years ago and hosted by then ABC Good Morning America host Joan Lunden took viewers into the operations command post of NEST during a simulated nuclear threat against the city of New Orleans. At the end of the exercise it was learned that the team had been unable to locate the device and an umpire for the exercise provided them with the location in order to continue the remainder of the test. Several years have passed since that airing and it can be assumed that the technology and training of the members has increased significantly and we can only hope that when an entire city is held hostage and threatened by an improvised nuclear WMD hidden in a car trunk sometime in the future, NEST will be ready. But if the location of the device is unknown or cannot reasonably be found in time, this may force a change in our strategy for dealing with terrorists.

For example, If a terrorist group were to deploy two such weapons and threatens to detonate one after the other until their demands were met how would we react? If the first one, placed in Chicago, is detonated would we be prepared to sacrifice Seattle next instead of meeting their demands and withdrawing our forces from South Korea, or the Balkans, or the Middle East? This type of scenario and the potential consequences will be crucial to negotiations on the part of both terrorists and officials and may force a change in tactics for both sides.

A LAYERED DEFENSE

Combating the threat posed by the potential smuggling of fissile material and its potential use within the borders of the United States or any other Western democracy currently focuses in two large arenas and is akin to establishing a layered defense consisting basically of two lines. The limited funds and resources available to combat the threat of WMD use in the United States forces us to divide our efforts and time between these first and second lines of defense.

The first line of defense focuses primarily on the FSU and surrounding regions and encompasses our efforts to interdict and upset the creation of the factors of Ullman's Triad to insure that complementarity and transferability between a potential buyer intent on obtaining a WMD, and an illegal supplier within the FSU, is never achieved. The second line of defense focuses primarily on efforts to interdict transferability closer to home and to prepare to react should our efforts fail.

These efforts have not been without their problems. Recently, the multi-billion dollar assistance provided to the Russians by the United States to help them in the construction of the Mayak fissile material storage facility was being taxed by the Russian government. Each of the specialized containers that were built in the United States to hold the Russian fissile material was slapped with an import tax before being allowed into Russia. According to Major General (retired) Ronald Lajoie, former head of the On-Site Inspection Agency, this taxation situation could bring further monetary assistance to a halt[287].

Since the break-up of the FSU, numerous programs and procedures have been established as part of our first line of defense to help disrupt the creation of complementarity. These include the nuclear Material Protection, Control and Accounting (MPC&A) program which consists of special inspection procedures that account for

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[287] Speech by MG(ret) Ronald Lajoie, former Director of the On-Site Inspection Agency, at the University of Washington on 12 March, 1999.

declared nuclear materials in participating member countries and are governed by the International Atomic Energy Agency[288]; The U.S. Department of Energy's Lab to Lab support programs. And the aforementioned American-financed construction of the storage site for bomb-grade fissile material at the Mayak Chemical Combine located at the former Tomsk-7 nuclear facility which will house approximately 40% of the weapons-grade fissile material in Russia[289].

These programs are but the start.[290] Additional efforts to disrupt the creation of complementarity could also include: Investing funds to install systems to help maintain accountability at FSU storage sites and laboratories [291]; Investing funds to construct additional storage facilities for the surplus fissile material[292]; Investing funds to construct

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[288] For additional information on this topic see the IAEA website at http://www.iaea.or.at/worldatom/inforesource/other/safeguards2/part9.html

[289] Speech by Dr. James L. Fuller, Ph.D., Director of the Pacific Northwest Center for Global Security at the University of Washington on 12 March, 1999.

[290] Excerpts from the prepared statement of Thomas E MacNamara, Assistant Secretary of State for Political-Military Affairs, Department of State, before the Senate Governmental Affairs Committee Permanent Investigations Subcommittee, 22 March 1996 also provide the following list of programs targeting both complementarity and transferability: Providing export control and customs enforcement assistance to affected states in Europe and Central Asia; Providing assistance to states and the IAEA in analyzing seized material and in developing accurate sources of information on smuggling cases; Opening additional law enforcement cooperation with key states in Europe affected by smuggling spearheaded by the FBI; Supplying equipment, technology, and training to states in Central Europe to permit them to detect nuclear trafficking on their territories; Upgrading the ability of key countries to exchange law enforcement intelligence and technical information; Hosting events such as the FBI-organized April 1995 meeting of international law enforcement officials from over 20 countries focusing on nuclear smuggling; And reinforcing U.S. export control assistance to countries of the Caucasus and Central Asia.

[291] Interview with Ambassador Graham.

[292] Dr. James L. Fuller, Ph.D., Physicist, Director Pacific Northwest Center for Global Security, and Major General (ret) Ronald Lajoie, Former Director of the On Site Inspection Agency, Interview by Max F.X. Gutierrez, Jr., 12 March, 1999, University of Washington, Both DR Fuller and MG(ret) Lajoie discussed the progress on the

reprocessing facilities; Investing in programs to support Russian law enforcement in their efforts to crack-down on increasing organized crime activities; Investing in programs to improve the economy and the lives of the people who have access to fissile materials; Establishing programs to support the retraining and relocation of the numerous scientists and physicists with weapons construction knowledge[293]

If, however such programs fail to halt the commodification of fissile material and complementarity between a seller and a buyer are created, we must then insure that obstacles prohibiting the transferability of fissile material are put into place, maintained, monitored and reevaluated constantly. These efforts comprise our second line of defense and such programs in place today include: Specialized training for foreign border control and frontier troops[294]; Joint Russian-FBI law enforcement programs in Russia[295]; Joint

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construction of the fissile material storage facility located near the Mayak facility. This site, scheduled to open in 2000, will house only 40% of the fissile material of the FSU.

[293] According to R. Adam Moody, "Proliferation Implications of the Brain Drain", Post-Gazette, 23 January 1999, between 1991 and 1996, about 5,000 personnel left the Ukrainian Southern Machine Building Plant (Yuzmash), which specializes in SS-18 missile R&D and production; By 1994, the Russian Scientific Center for Virology and Biotechnology (Vector), which specializes in biological warfare agent R&D, had lost about 3,500 personnel since the 1980s; And between 1992 and 1993, Impuls NPO (Moscow), which produces guidance systems, electro-optics, and civilian electronic equipment, lost about 1,800 personnel; and between 1991 and 1996, the All-Russian Scientific Research Institute of Experimental Physics (Arazmas-16), which specializes in nuclear warhead R&D, lost about 5,000 personnel.

[294] Dr. William C. Cliff, Ph.D., Manager, International Border Security, National Security Division, Pacific Northwest National Laboratory, interview by Max F.X. Gutierrez, Jr., 10, 11 April, 1999, PNNL, Hanford Washington, Dr. Cliff provided an extensive informal briefing and tour of the Interdict/Radicad training program and facilities which trains foreign border control personnel in WMD counter proliferation focusing on the four missions of Detection, Identification, Interdiction and Investigation.

[295] FBI Special Agent Barry Tobin, WMD Coordinator for Seattle, interview 30 April, 1999.

Russian-U.S. Customs inspection programs in Russia[296]; Development of specialized sensing equipment to support both U.S. Customs inspectors and foreign border control personnel[297].

By disrupting the creation of complimentarity and placing effective obstacles that will interdict and halt transferability, we can better prevent the commodification of FSU fissile material and its movement toward our shores in the near future.

In addition to our efforts to disrupt the creation of complementarity and the interdiction of transferability, we must also prepare the home-front to respond to an attack if a WMD is employed in an American city. Each city is currently receiving training to be prepared to meet the challenge. In addition major metropolitan centers are continuing with the establishment of various specialty teams such as the Metropolitan Medical Strike Team (MMST) and special training on chemical and biological casualty handling through conferences sponsored by the Department of Health and Human Services-Public Health Service (HHS-PHS), as well as numerous training activities sponsored by the Federal Emergency Management Agency (FEMA) to supply special training to medical, fire rescue and other first responder personnel[298].

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[296] Special Agent Christopher Fiesel, Department of the Treasury, U.S. Customs Service, Office of Enforcement, Interview with Max F.X. Gutierrez, Jr., Feb-March 1997, U.S. Embassy, Moscow Russia, Discussion on various joint Russian-U.S. Customs programs to include Customs agents stationed in Moscow working together with their counterparts and exchanging techniques and information.

[297] Mr. Aaron A. Diaz, Senior Research Scientist, Pacific Northwest National Laboratory, interview by Max F.X. Gutierrez, Jr., 11 April, 1999, PPNL, Hanford Washington, Mr. Diaz demonstrated two new detection devices, the Materials Identification System (MIS), which rapidly identifies strategic and high-value items and materials, and the Ultrasonic Pulse Echo (UPE) which can detect contraband in liquid-filled containers as well as contraband hidden in solid forms. Both of these devices are currently being fielded to border control personnel in several FSU countries.

[298] FBI Special Agent Barry Tobin, WMD Coordinator for Seattle, interview 30 April, 1999.

The FBI is also training Initial Assessment Teams (IATs) which will be assigned to each FBI field office and will be able to go into the biologically or chemically contaminated "hot zone" to gather critical evidence which will then be turned-over to forensic investigators who will put their skills to work tracing the component parts used in the device and ultimately convict and bring to justice the perpetrators.[299]

This explains one important reason why a terrorist group, currently denied a nuclear WMD, will nevertheless continue to desire one above all others (especially a rogue state who might be sponsoring the group who would carry-out the attack). The FBI may be able to trace the residue from a chemical or biological attack and pin-point the perpetrator, group or country, but it will be almost impossible to do so if a nuclear WMD is used. Most, if not all of the evidence that might be gathered to trace and convict the perpetrators, would be completely incinerated by the detonation.

Today, according to an interview with FBI Special Agent Barry Tobin, WMD coordinator for the Seattle region, the most likely, albeit not the most destructive threat of WMD use within the Continental United States continues to come in the form of a biological WMD deployed by domestic terrorists. But, despite the current activity seen towards the use of a biological weapon on the domestic scene, he admitted that given a choice, a terrorist organization would still rather have a nuclear WMD, because in addition to the reasons mentioned above, such a device would cause the greatest impact and be sure to garner the ultimate television coverage for their cause[300].

This work has tried to clearly and simply demonstrate the irrefutability of the assertion that by meeting the rigorous requirements of Ullman's Triad, trade in any commodity, to include FSU fissile material, can occur. And that a substance as potentially dangerous as HEU (U-235/U-233) or plutonium (Pu-239), which has no real

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[299] ibid.

[300] FBI Special Agent Barry Tobin, WMD Coordinator for Seattle, interview 30 April, 1999.

commercial purpose outside of special uses can, given the right circumstances, undergo the process of commodification and potentially fall into the wrong hands. I therefore submit, based on the information provided, that the risk posed by the detonation of a single terrorist improvised nuclear device on American soil is directly related to the continuing risk posed by post-Soviet fissile material diffusion, and this risk will continue to escalate in proportion to the continued declining of the economic, political and social conditions of the FSU as outlined in the framework of Ullman's Triad.

On January 22, 1999, Ambassador Robert Gallucci, U.S. special envoy on proliferation matters and former deputy executive chairman of the UN inspection team in Iraq and former chief U.S. negotiator on the framework agreement for dismantling North Korea's nascent nuclear weapons program and one of the architects of the U.N weapons inspection program in Iraq, predicted that within ten years an American city will be destroyed by an improvised nuclear device." According to Ambassador Gallucci, "ships, planes and trucks are... good ways to deliver nuclear weapons. We don't have very good defenses against those...if you want to sneak a nuclear weapon into the United States, hide it in a bale of marijuana."[301]

This is a wake-up call for America. Our time may already be short and we can no longer afford to be apathetic concerning the threat posed to the United States by an improvised nuclear device created from the fissile material of the Former Soviet Union.[302] We must continue to support the programs that are currently in place and recognize that this will be a long-term problem with now short, easy solutions. We must

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[301] Jack Kelly, "Arms expert warns U.S. cities face nuclear terrorism threat", Post-Gazette, 23 January 1999.

www.post-gazette.com/headlines/19990123gallucci3.asp

[302] A nationwide survey found that a majority of Americans do not worry a great deal about the threat posed by an terrorist nuclear WMD. The Pew Research Center For The People & The Press, "Public Apathetic About Nuclear Terrorism."

www.people-press.org/terrep.htm

also be prepared to commit additional public and private resources in an effort to disrupt the development of complimentarity and interdict transferability. This very real threat to our security cannot, in my opinion, be overstated.

BIBLIOGRAPHY

Allison, Graham T. Owen R. Cote, Jr., Richard A. Falkenrath and Steven E. Miller, Avoiding Nuclear Anarchy: Containing the Threat of Loose Russian Nuclear Weapons and Fissile Material, CSIA Studies in International Security No 12, Cambridge, Massachusetts, The MIT Press 1996

"Biological Agents and Weapons", Briefing for foreign Customs and Border Control agents at Pacific Northwest National Laboratory's INTERDICT/RADACAD training program, HAMMER Training Center, Richland Washington

Brookings Institute Report, "The Costs of the Manhattan Project", The U.S. Nuclear Weapons Cost Study Project,

http://www.brook.edu/FP/PROJECTS/NUCWCOST/MANHATTN.HTM

Bukharin, Oleg and William Potter, "Potatoes were guarded better", Bulletin of The Atomic Scientists, May-June,1995

Central Intelligence Agency, The World Fact Book 1995, Central Intelligence Agency, Washington DC 1995

"Chemical Attack Lessons", Army Times, 19 April, 1999

"The China Syndrome", ABCNEWS.COM

http://abcnews.go.com/sections/world/DailyNews/china_thisweek980315.html

Clarke, Douglas L., "Naval Nuclear Waste Poses Immense Risk", Transition, Vol.1/21, 17 November, 1995

Cliff, William C. Cliff, Dr., Ph.D., Manager, International Border Security National Security Division, at the Pacific Northwest National Laboratory (PNNL) in Richland Washington, Personal interview, 5/6 April, 1999

Cockburn, Andrew & Leslie, One Point Safe, New York: Anchor Book Doubleday 1997

Chronik der Schweiz, Chronik Verlag, Dortmund, Germany und Ex Libris Verlag, Zurich, Switzerland, 1987

Craig, Paul P. and John A. Jungerman, Nuclear Arms Race: Technology And Society, New York, McGraw-Hill Book Company, 1986

Cummings, Bruce, review of Never at War: Why Democracies Will Not Fight One Another, by Spencer Weart, Yale University Press, 1998, in The Bulletin of the Atomic Scientists, May/June, 1999

Del Tredici, Robert, At Work In The Fields Of The Bomb, New York, Harper & Row Publishers, 1987

"Der Bomben-Schwindel des BND", Der Spiegel, No. 15, 1995

Diaz, Aaron A, Senior Research Scientist, Pacific Northwest National Laboratory, Personal interview, 11 April, 1999

"Far East Soldiers on Natural Foods Regimen", RFE/RL Newsline Vol. 3, No. 29, Part I, 11 February, 1999

"FBI Probes Serbian Terrorist Threats", Army Times, 26 April, 1999

Federal Bureau of Investigation, Terrorism in the United States: 1995, Washington, DC, U.S. Department of Justice, 1996

Federal Bureau of Investigation Headquarters, Domestic Terrorism Weapons of Mass Destruction Operations Unit Report to Congress on Responses to Threats of Terrorist Use of Weapons of Mass Destruction January 31, 1997, Unclassified background information on PDD-39

Fiesel, Christopher, Special Agent, U.S. Department of the Treasury, U.S. Customs Service, Office of Enforcement, Moscow, Russia, Personal interview, Feb-March 1997

Fuller, James L., Dr., Ph.D., Director of the Pacific Northwest Center for Global Security, Speech and Q&A session at the University of Washington on nuclear proliferation followed by personal interview, 12 March, 1999

Funke, Johannes M., Special Agent, Bundeskriminalamt, Personal Interview, June, 1996

Galeotti, Mark, "Russian Organized Crime," Jane's Intelligence Review, Vol. 7, No. 6, May, 1996

General Accounting Office (GAO) ,"National Security: Impact of China's Military Modernization in the Pacific Region", GAO/NSIAD-95-84, June 1995

Graham, Thomas Jr., Ambassador and President of the Lawyers Alliance For World Security (LAWS), personal interview

Haggett, Peter, GEOGRAPHY: A MODERN SYNTHESIS, New York, Harper and Row, Publishers, 1972

Handelman, Stephen, "The Russian Mafiya", Foreign Affairs, Vol. 73, No. 2, March/April, 1994

Health official, Palm Desert California, Personal conversation during incident, 24 December,1998

Heinrich, Andreas and Heiko Pleines, "Russia's Nuclear Flea Market Tempts Smugglers", Transition, Vol. 1 No 21, 17 December 1995

Hendrickson, David C., "In Our Own Image-The Sources of American Conduct in World Affairs", The National Interest, Winter 1997/98

Herman, David, "Anthrax threat forces quarantine of shoppers," *The Desert Sun* , December 25th, 1998

Hibbs, Mark Hibbs, "Nuclear Smuggling: Which fissile fingerprint?", The Bulletin of the Atomic Scientists, May/June, 1995

Hoffman, Bruce, Inside Terrorism, New York, Columbia University Press, 1998

Hoffman, David, "Russia's Nuclear Sieve Moscow meeting to focus on plugging safety gaps", Washington Post, April 17, 1996

Hohlov, Aleksandr, "Smozhet li Shamil Basaev Ukrast Atomnuiu Bombu?", Komsomolskaia Pravda, Saturday, 22 July, 1995

Hornbach, Chuck, National Public Radio broadcast, 15 April, 1999

"Hundreds of Deserters Arrested; Problems Remain", CDI Russia Weekly, 29 January, 1999, djohnson@cdi.org

Hunt, Terence, Associated Press, "N. Korea warned against weapons", Seattle Times, Sunday, November 22, 1998

International Atomic Energy Agency, "Can the IAEA Prevent the Diversion of Declared Material?"

http://www.iaea.or.at/worldatom/inforesource/other/safeguards2/part6.html

Isby, David, C., Weapons and Tactics of the Soviet Army, London, Janes Publishing Ltd., 1988

Klare, Michael, ROGUE STATES AND NUCLEAR OUTLAWS[AMERICA'S SEARCH FOR A NEW FOREIGN POLICY], New York: Hill and Wang, 1995

Krumme, Gunther, Professor, University of Washington, Personal Interview, 10 February, 1999

Lajoie, Ronald, Major General (retired), former Director of the On-Site Inspection Agency, Speech and Q&A session at the University of Washington on the status and problems of nuclear material storage at the Mayak storage facility, Russia, 12 March, 1999

Lee, Rensselaer W. III, "Smuggling update", Bulletin of the Atomic Scientists, (Educational Foundation for Nuclear Science) Vol. 53, No. 3, May/June 1997

Lee, Rensselaer W. III, Smuggling Armageddon The Nuclear Black Market in the Former Soviet Union and Europe, New York, St. Martins Press 1998

Lesce, Tony Wide Open To Terrorism, Port Townsend, Washington, Loompanics Unlimited, 1996

Lockheed Martin Services video, Border Enforcement Radiation Detection

"Loose Nukes: Uranium, Plutonium, Who's Got the Goods? Nuclear Nations Ask", Wall Street Journal, May 11, 1994

Mark, J. Carson, "Explosive Properties of Reactor-Grade Plutonium", Science & Global Security, Vol. 4, No. 1, 1993

"Mezhdunarodnyi Terrorist Pitalsia Kupit V Rossii Iadernuiu boegolovku", Nizavisimaia Gazeta, 16 December, 1998

Mikerin, Yevgeni, Vice Minister of Atomic Energy, "Pfeile gegen Rusland", Interview Der Spiegle, No. 17, 1995

Mills, C. Wright, The Power Elite, London, Oxford University Press, 1956

Monterey Institute of International Studies and The Carnegie Endowment for International Peace, Nuclear Successor States of the Soviet Union: Status Report on Nuclear Weapons, Fissile Material and Export Controls, No 5, March 1998, Carnegie Endowment for International Peace, Washington, DC in cooperation with the Monterey Institute of International Studies, Monterey, CA, 1998

Moore, Mike, review of Israel and the bomb, by Avner Cohen, Columbia University Press, 1998, in The bulletin of the Atomic Scientists, Jan/Feb 1999

"Moskva Zhelaet Presech Kontrabandu Iadernogo Topliva". Segodnia, 17 August, 1994

National Defense University Institute for National Strategic Studies, Strategic Assessment 1995 U.S. Security Challenges in Transition, Fort Lesley J. McNair, Washington DC, 1995

National Defense University Institute for National Strategic Studies, Strategic Assessment 1996 Instruments of U.S. Power, Fort Lesley J. McNair, Washington DC, 1996

National Defense University Institute for National Strategic Studies, Strategic Assessment 1998 Engaging Power For Peace, Fort Lesley J. McNair, Washington DC, 1998

Netanyahu, Benjamin, Prime Minister of Israel, FIGHTING TERRORISM How Democracies Can Defeat Domestic And International Terrorists, New York: The Noonday Press, 1995

Nilsen, Thomas and Nils Bohmer, Sources to radioactive contamination in Murmansk and Arkhangel'sk county, The Bellona Report, Volume 1, 1994

North Atlantic Treaty Organization, NATO Handbook, NATO Office of Information and Press, Brussels, 1995

Orlov, Vladimir Andreevich, Editor in Chief of the Journal Yaderny Kontrol, "Iadernii Shantazh: Ugrozy "Vnutrennikh Vragov" Nastorazhivaiut Bolshe, Chem Proiski Izvne", Nezavisimaia Gazeta, 29 August, 1997

PBS FRONTLINE, Video "Russian Roulette: The security of Russia's nuclear arsenal", 23 February, 1999

PBS FRONTLINE, Transcript "Loose Nukes", 19 November, 1997

Reich, Walter, ed., Origins of Terrorism Psychologies, ideologies, theologies, states of mind, Washington, DC, Woodrow Wilson Center Press, 1998

Rhodes, Richard, The Making of The Atomic Bomb, New York:, Simon & Schuster, 1986

"Russia nabs 626 Deserters", Army Times. 8 February, 1999

Sakitt, Mark, Submarine warfare in the Arctic: Option or illusion?, Stanford, California: Stanford University, International Strategic Institute, 1988

"Schweizerish-turkischer Uranhandel aufgeflogen: Verhaftungen in beiden Landern", Neue Zurcher Zeitung, Friday, 2 February, 1996

Sidell, Frederick R., MD, William C. Patrick, III, Thomas R. Dashiell, Jane's Chem-Bio Handbook , Alexandria Virginia, Jane's Information Group, 1998

Silverstein, Ken "Tale of the Radioactive Boy Scout", Harpers Magazine, November, 1998

Silverstein, Ken, "Tale of the Radioactive Boy Scout", Reader's Digest, March 1999

Smirnov, Yuri, Interview by PBS FRONTLINE, Loose Nukes, WGBH Boston Public Television, November 19,1997

Taaffe, Edward J., Howard L. Gauthier and Morton E. O'Kelly, Geography of Transportation, New Jersey, Prentice Hall, 1996

Taylor, William J., Jr. and Abraham Kim, Dianne L. Smith, Ed., "Part II China: A Central Player's Rapprochement with Russia", ASIAN SECURITY TO THE YEAR 2000, U.S. Army Strategic Studies Institute, Carlisle Barracks, Pa. , 1996

"The do-it-yourself reactor", The Bulletin of the Atomic Scientists, Vol. 55, No. 1, January/February 1999

Thoman, Richard S. and Peter B Corbin, The Geography of Economic Activity, New York, McGraw-Hill Book Company,1974

Thomas, William L., Jr., Ed. ,Man's Role in Changing the Face of the Earth, Chicago, The University of Chicago Press, 1956

Tobin, Barry, FBI Special Agent and WMD Coordinator for Seattle, Personal interview, 30 April, 1999

Totrov, Yuri, Member of the Board of Directors of the Association of Retired Intelligence Officers of Russia, Personal Interview, 30 January, 1997

Ullman, Edward, L., Geography as Spatial Interaction, Seattle, University of Washington Press, 1980

Undem, Halvor, Dr., Ph.D., Program Manager for Arms Control and Nonproliferation, National Security Division, Pacific Northwest National Laboratory, Richland, Washington Personal Interview, 5/6 April, 1999

U.S. Congress, Office of Technology Assessment, Technologies Underlying Weapons of Mass Destruction, OTA-BP-ISC-115, Washington DC: U.S. GPO, December 1993

U.S. Customs Service, "The New International Criminal", Briefing for foreign Customs and Border Control agents at the INTERDICT/RADACAD training program, HAMMER Training Center, Richland Washington

U.S. Department of Energy, Nuclear Terms Handbook 1998, The United States Department of Energy Office of Nonproliferation and National Security Office of Emergency Management, 1998

U.S. Department of Energy presentation, Conference on WMD and Counterterrorism, 18-22 November, 1996, Virginia Beach, Virginia

U.S. Department of Energy, Office of Arms Control and Nonproliferation, Los Alamos National Laboratory LA-13131-M Manual, A Handbook for the Nuclear Suppliers Group Dual-Use Annex, April 1996

U.S. Federal Emergency Management Agency presentation, Conference on WMD and Counterterrorism, 18-22 November, 1996, Virginia Beach, Virginia

U.S. Federal Emergency Management Agency, Unclassified PDD-39 Abstract, Washington, DC

"Verhaftung zweier Litauer in Miami: Atomwaffenschmuggel nach den USA verhindert?". Neue Zurcher Zeitung, Wednesday, 7 February, 1997

Video tape, Russian-made, Subject: Krasnoyarsk-26 Plutonium factory, Personal viewing at Pacific Northwest National Laboratory, Richland, Washington

Wagner, Eric, "Stolen Secrets", ABCNEWS.COM, 9 March, 1999

http://abcnews.go.com/sections/world/DailyNews/chinanuclear_wagner.html

Webster, William H., Project Chair, The Nuclear Black Market, Global Organized Crime Project, Center for Strategic and International Studies, 1996

Webster's New World Dictionary, Second Concise Edition, 1982

Wheeler, James O. and Peter O. Muller, Economic Geography, New York, John Wiley & Sons, 1981

Willingham, Dr. Charles E., Senior Research Scientist, Pacific Northwest National Laboratory, "Scams", Briefing for Foreign Customs and Border Control agents, INTERDICT/RADACAD training program, Richland Washington

Zimmerman, Peter "Technical Barriers to Nuclear Proliferation", in Zachary Davis and Benjamin Frankel, eds., "The Proliferation Puzzle: Why Nuclear Nations Spread(and What Results)," Security Studies, Vol. 2, Nos.3-4, Spring/Summer 1993

APPENDIX A: U.S. GOVERNMENT CHRONOLOGY OF NUCLEAR SMUGGLING INCIDENTS 1993-1996

U.S. Government Chronology, 1993-1996

March 21, 1996

(The following Chronology of Nuclear Smuggling Incidents was an appendix to the March 20 testimony by Director of Central Intelligence John Deutch before the Senate Permanent Investigations Subcommittee on global proliferation of weapons of mass destruction and illicit trafficking of nuclear materials.)

Date of Event

---- 1996 ----

17 March -- Tanzanian police arrested one individual last week and seized a container of radioactive cesium.

9 March -- Romanian police announced on 8 March that they are holding two individuals for attempting to sell stolen radioactive material, according to press reports. A police spokesman announced that the two had in their possession 82 kg of radioactive material including low enriched uranium. Officials also found reportedly secret documents stolen from the Research and Design Center for Radioactive Metals.

4 March -- UPDATE (12 February): According to press reports, Lithuanian officials have determined that the 100 kg of radioactive material seized last month from an armed gang is uranium-238. This material was stolen from a company responsible for maintenance at the nearby Ignalina nuclear power plant.

23 February -- According to press reports, the Belarus Committee for State Security (KGB) seized five kilograms of cesium-133. The radioactive metal reportedly was sealed in glass containers. Belarus authorities are investigating the incident, according to press.

12 February -- Lithuanian authorities announced that they had arrested seven people and seized nearly 100 kg of radioactive material, according to press

reports. The material, believed to be uranium, will undergo further tests to ascertain its makeup and origin. It was emitting 14,000 microroentgens per hour.
Some reports stated that the material was a component of a nuclear fuel assembly which has been missing from the nearby Ignalina nuclear power plant for several years. The Ignalina plant manager claims that the seized material is not nuclear fuel or equipment used at his facility.

1 February -- Swiss federal prosecutors announced on 1 February the arrest of a Swiss citizen of Turkish descent for attempting to sell a sample of "slightly-enriched" uranium in Switzerland, according to press. Swiss authorities stated that the individual claimed the sample was part of a larger cache still in Turkey. Turkish police using information from their Swiss counterparts, then arrested eight people and seized 1.128 kg of similar material. Press reports indicate that the uranium was similar to that used in nuclear power-plant fuel rods. Swiss authorities reportedly are conducting tests to determine the uranium's country of origin.

25 January -- According to press reports, German authorities have charged a merchant and his lawyer with crimes stemming from their attempt to sell radioactive cesium to another merchant who was a police informant. The cesium reportedly was transported to Germany from Zaire on board a commercial airliner.

21 January -- UPDATE (7 November 95): The German parliamentary commission investigating the 1994 plutonium smuggling incident, reportedly has uncovered German government documents indicating that the three smugglers offered to supply 11 kilograms of Russian-origin, weapons-grade plutonium, which they claimed was enough to build three nuclear weapons, according to press reports.

18 January -- According to press reports, German authorities have charged a merchant and his lawyer with crimes stemming from their attempt to sell radioactive cesium-137 smuggled from Zaire to another merchant who was a police informant. The cesium reportedly was transported to Germany from Zaire on board a commercial airliner.

17 January -- A Palestinian in Dubai, UAE has offered to sell three kilograms of reportedly Russian-origin red mercury to a Lebanese-American businessman, according to US diplomatic reporting.

---- 1995 ----

28 December -- According to press reports, the Russian Federal Security Service (FSB) arrested nine members of a criminal organization in Novosibirsk and seized a quantity of radioactive material. The material was identified in press reports as "enriched" uranium-235. The material had been transported to Novosibirsk by middlemen, possibly from Kazakstan. The ultimate destination may have been South Korea, according to press reports.

2 December -- UPDATE (9 Nov 95): According to Italian press reports, Italian prosecutors have arrested an individual, Roger D' Onofrio, with reported links to the US Central Intelligence Agency (CIA) and the Italian-American Mafia as part of their investigation of smuggling radioactive materials, money-laundering and arms trafficking. D'Onofrio, 72, reportedly has dual Italian and U.S. citizenship and retired from the CIA only two years ago. The ring he is alleged to have been part of is said to have been active from the early 1990s up to this year. Italian investigators reportedly suspect that D'Onofrio is the mastermind behind an international ring which laundered dirty money and smuggled gold, weapons and radioactive material. His name also appears in another investigation into an arms smuggling operation between Italy and the Middle East, according to press reports. D'Onofrio was taken into preventive custody on charges of money laundering and acting as a broker in illegal currency dealing. According to press, the prosecutors had so far ascertained money laundering for over 2.5 billion dollars on behalf of secret service and organized crime sources in complicity with diplomats, the ruling families in Kuwait, Morocco and Zambia, bankers, prelates and others.

1 December -- UPDATE (23 November): According to US diplomats in Moscow, the Russian Federal Security Service (FSB) delivered an official statement to US officials regarding the radioactive material discovered in Izmailovsky park on 23 November. The container, which held cesium-137, posed no public health threat. Radiation levels of the cesium were between 10 to more than 50 millicurrie. The radioactive material may have been used as an instrument calibration source used in flaw detection equipment.

30 November -- A former Greenpeace president revealed that the organization had been offered a nuclear warhead by a disgruntled former Soviet officer keen to highlight lax security, according to press accounts. The former Greenpeace official stated in a recently published book that a Soviet officer with access to nuclear weapons offered Greenpeace an 800 kg nuclear Scud warhead for public display in Berlin. The offer was made shortly before 7 September 1991.

29 November -- Russian security officials have recovered four containers with radioactive cesium, stolen from an industrial plant in the Urals and arrested the

thieves, according to press reports. Federal Security Service (FSB) officers found the 90-kilogram (198-pound) containers in a shaft of an old mine, the ITAR-Tass news agency reported. One of the alleged thieves, the Bakal mining plant's electrical engineer, had initially kept them at his vegetable garden but moved them to a safer place after the theft had been discovered, claimed security officials. Two officials of a local penitentiary were his accomplices, they further alleged. Each container held a capsule with cesium 137, a radioactive isotope used in geological research, as well as in medicine. The containers were similar to the one allegedly planted by Chechen rebels in a Moscow park.

23 November -- Acting on a tip from Chechen separatist leader Basayev, Russian television reporters discovered a 32 kg container -- reportedly holding cesium-137 -- in a Moscow park. The container was reportedly removed and turned over to the Russian Federal Security Service (FSB). FSB officials stated that an official investigation was underway and that no further comments would be made until the inquiry was completed, according to press reports. Television reports quote a highly-placed FSB officer as stating unofficially that the object was a piece of a hospital x-ray machine. Basayev claimed earlier this month that several containers of radioactive material attached to explosive devices had been planted in Russia. In a television interview aired on 15 October, Russian Interior Minister Kulikov stated that Chechen separatist leader Basayev might have radioactive waste or radioisotopes taken from the Budyonnovsk hospital seized by Chechen rebels last spring.

23 November -- UPDATE (7 Nov 95): A German court sentenced Adolph Jaekle, a German businessman, to 5 1/2 years in prison for smuggling weapons grade plutonium into the country, according to press reports. Investigators made the first in a series of contraband plutonium seizures in Germany when they raided Jaekle's home, in the southern town of Tengen in May, 1994, and found a lead cylinder containing 6.15 grams of plutonium 239. Jaekle had pleaded not guilty to the plutonium charge, arguing that he did not know what the substance was.

11 November -- Russian Federal Security Service (FSB) officials arrested two Lithuanian citizens in Smolensk for smuggling 10 kgs of "uranium-238" into Russia, according to Russian television reports. Three Russians also were arrested for attempting to sell the uranium. Both the Lithuanians and the Russians claimed that poverty had induced them to attempt to traffic in smuggled nuclear materials. According to press accounts, Russian authorities stressed that the material was not weapons grade and had no commercial or industrial uses.

9 November -- Italian prosecutors reportedly have asked Spanish authorities for permission to question the Archbishop of Barcelona about his role in an

international criminal syndicate involved in smuggling radioactive materials, according to Italian press accounts. Accusations against the Archbishop arose after Italian officials tapped a telephone conversation in which the Archbishop was named as playing a leading role in the criminal enterprise. Both the Archbishop and the Vatican have vehemently denied the accusations. The Spanish Justice ministry has characterized the Italian request as "not very well thought out." The Italian investigation grew out of an earlier probe into money laundering operations which reportedly uncovered information that a criminal enterprise involving a self-professed Italian intelligence official, was attempting to sell 7.5 kg osmium for $63,000 per gram, according to Italian press accounts.

7 November -- During a search of a car at the Polish-Czech border, Polish Border Guards discovered 11 cigarette pack-size containers filled with strontium-90, according to press accounts. This incident is the first case in 1995 involving smuggling radioactive material through Poland.

7 November -- UPDATE (10 Aug 94): Adolf Jaekle, accused of smuggling Russian-origin plutonium following a May 1994 raid on his home, denied any involvement in nuclear smuggling, according to press reports. Jaekle insisted that the container of plutonium was planted at his home and that the container was not the same one he took from a Swiss associate for metal reprocessing.

7 November -- Iranian press reports indicate the Iranian law enforcement authorities have arrested five Iranians and seized nine packets of uranium in Tehran and two other cities. No details were released regarding amount of material or whether it was enriched or not.

25 October -- The cleaning staff at Moscow's Sheremetyevo 2 airport found a small lead container packed with radioactive substances in the men's restroom, according to press reports. Experts reportedly are attempting to determine the exact composition of the three sources of ionizing radiation found in the container. The speculation, in the Russian press, was that a nuclear smuggler lost his nerve and abandoned the material during an aborted smuggling attempt.

19 October -- UPDATE (10 Aug 94): According to a 19 October article in "Der Stern," nuclear weapons smugglers involved in smuggling Russian-origin plutonium into Germany in August 1994 have stored eight to ten kilograms of weapons-grade plutonium in Berlin. The article also implicates highly placed Russians in the smuggling activity.

14 October -- Russian Mafia figures reportedly were behind the 1993 theft of radioactive beryllium from a Russian nuclear laboratory and the failed attempt to

sell the material in the West, according to press reports. The theft, which was widely reported in 1993, was seized by police in Lithuania and remains today in the bank vault where it was first discovered. According to press, the smugglers were preparing to sell the beryllium to an Austrian middleman who in turn had a mystery buyer who reportedly was willing to pay as much as $24 million for the material. The buyer, although never identified, was said to be Korean.
Beryllium, which is used in missile guidance systems, is a highly efficient neutron reflector, according to public statements by nuclear scientists.

10 October -- Russian authorities claim that there have been no identified incidents in which weapons-grade radioactive material has been smuggled out of Russia, according to press reports. In a press conference, Russian General Terekhov of the Interior Ministry, stated that of the 16 cases involving theft of radioactive materials, none could have been used to make nuclear weapons. He also ruled out any involvement by Russian organized criminal organizations in the thefts. The general claimed that the thefts were spontaneous actions by individuals working at nuclear facilities. The Russian officials concluded the press conference by stating that there is no black market in nuclear materials.

1 September -- According to press reports, Bulgarian police had broken an international nuclear smuggling ring composed of Russians and Ukrainians. Police spokesmen, declining to disclose details only said that the materials seized were of strategic value and included rare metals. The arrests were the culmination of a year-long undercover operation. Senior police officials commented that they were still investigating the final destination of the materials, some of which were radioactive.

15 June -- Press reports indicate that so far in 1995 Romanian authorities have seized 24 kgs of uranium powder and tablets, and in 1994 they arrested 24 people for involvement in nuclear smuggling and seized 10.35 kgs of uranium powder and tablets. From 1989 to 1993, the Romanians reportedly broke up five gangs, arrested 50 people, and seized 230 kgs of nuclear material.

13 April -- Slovak police culminated a long investigation with the discovery of 18.39 kg of nuclear material, 17.5 kg of which apparently is U-238, in a car stopped near Poprad in eastern Slovakia. Altogether, three Hungarians, four Slovaks, and two Ukrainians were arrested. This gang was connected to three other nuclear material smuggling incidents.

5 April -- Four brass containers weighing 2 kilos each containing radioactive americium-241 and cesium-137 were stolen from a storeroom of isotopes in Wroclaw, Poland.

4 April -- Press reports that 6 kg of U-235, U-238, radium and palladium were found in a Kiev apartment. Occupants were ex-army, a lieutenant colonel and a warrant officer, and material reportedly came from Russia.

2 April -- Documents recovered by Japanese police in the investigation of Aum Shinrikyo involvement in the Tokyo subway Sarin gas attack reportedly indicated that the terrorists were collecting information on uranium enrichment and laser beam technologies. A spokesman for Russia's prestigious nuclear physics laboratory, Kurchatov Institute, acknowledged that at least one Aum Shinrikyo follower was working at the institute.

14 March -- Polish police in Bielska-Biala province arrested a man for possession of uranium.

8 March -- Italian police arrested one Nicola Todesco for murder in a plutonium smuggling case gone awry when the murder victim did not have the money to pay for a quantity of plutonium smuggled out of Bulgaria. Todesco claimed be threw 5g of plutonium into the Adige river, but no trace of it was found after an extensive search. (Comment: Although an official Italian spokesman believed the plutonium was "enriched for military use," it had not been analyzed and may be another scam involving `plutonium screws' from smoke detectors.

25 January -- According to Talinn news broadcasts, Lithuanian border police, using U.S.-supplied stationary radiation detectors, seized two tons of radioactive wolfram hidden in a secret compartment in a truck trailer. (The "wolfram" is tungsten, which has a short half-life, and probably was "infected" by a radioactive contaminant.) The incident occurred at the Lithuanian-Belarus border, and the truck's owner and two other men were arrested. A similar incident occurred a week earlier at another border post but no details are available.

---- 1994 ----

14 December -- Czech police seized 2.72 kg of material -- later identified as 87.7 percent enriched U-235 -- in Prague; this is the largest recorded seizure of such material. Police arrested a Czech nuclear physicist and two citizens of the Former Soviet Union. The uranium apparently came from the FSU and was to be smuggled to Western Europe.

10 December -- Press reporting indicates Hungarian border guards seized 1.7 kg of uranium and arrested four Slovak citizens. The material (depleted uranium and reactor fuel grade) reportedly was concealed in a fruit jar and was to be smuggled into Austria.

6 December -- In a long article in "Pravda", it was reported that three staffers of the Institute of Nuclear Physics were convicted of stealing 4.5 kg of uranium.

10 November -- Press reporting indicates Hungarian police discovered 26 kg of radioactive material in the trunk of a car. Three suspects were subsequently arrested.

November -- Press reporting indicates German police seized 1 milligram of cesium-137 in early November and arrested two suspects.

19 October -- Press reporting indicates Turkish police arrested an Azeri national trying to sell 750 g of uranium.

17 October -- Press reporting indicates Russian authorities seized 27 kg of U-238, an unknown quantity of U-235 and detained 12 members of a criminal gang.

October -- Press reporting indicates that in mid-October, four Indian villagers were arrested attempting to sell 2.5 kg of yellowcake, i.e. uranium extracted from ore.

13 October -- Press reporting indicates Bulgarian officials seized four lead capsules suspected of containing radioactive material. The capsules were found on a bus en route to Turkey and police detained the two bus drivers.

10 October -- Press reporting indicates Romanian authorities arrested seven people and seized 7 kg of uranium and an unidentified quantity of strontium or cesium.

01 October -- Press reporting indicates Romanian police arrested four people trying to sell over 4 kg of U-235 and U-238.

October -- Press reporting dated 26 October indicates Russian authorities arrested three men trying to pass 67 kg of U-238 to unidentified individuals in the city of Pskov.

28 September -- Press reporting indicates that a container with radioactive substances was found on a street in Tallinn.

28 September -- Romanian authorities arrested several individuals who were attempting to sell 4.55 kg of uranium tetrachloride (61.9 percent uranium) for $25 thousand per kg, according to press reports.

28 September -- Press reporting indicates Slovak officials arrested four Slovaks trying to smuggle almost 1 kg of U-235 (judged not to be weapons-grade) into Hungary.

26 September -- Press reporting indicates the discovery of a glass flask containing unspecified "weak radioactive material" at the Wetzlar railroad station in Germany.

September -- A Pole tried to sell 1 kg of U-235/238 in Germany. A German court subsequently sentenced him to two and a half years in prison for trading in radioactive uranium.

11 September -- Press reports indicate German police arrested a Zairian national attempting to smuggle 850 g of uraninite into Germany.

07 September -- Press reports indicate Russian police arrested three people in Glazov trying to sell 100 kg of U-238.

05 September -- Press reports indicate Bulgarian authorities arrested six Bulgarians in connection and seized 19 containers of radioactive material.

30 August -- Press reports indicate thieves broke into a chemical plant in Tambov and stole 4.5 g of cesium 137.

29 August -- Press reports indicate Hungarian police arrested two men and seized 4.4 kg of material believed to be fuel rods from a reactor in Russia.

20 August -- Press reports Russian authorities arrested two men attempting to steal 9.5 kg of uranium 238 from the Arzamas-16 nuclear weapons research facility.

18 August -- Press reports indicate Estonian police arrested a man and seized 3 kg of U-238 he had buried under his garage.

According to press reporting, about 100 uranium-contaminated drums were stolen from South Africa's Atomic Energy Corporation plant in Pelindaba, Transvaal.

12 August -- Press reports indicate that St. Petersburg police arrested three men trying to sell 60 kg of unidentified nuclear material.

12 August -- Press reports indicate German police in Bremen arrested a German who claimed to have 2 g of plutonium; the sample contained only minute

amounts of legally obtainable plutonium.

10 August -- Press report indicates that over 500 g of nuclear material were seized at Munich airport. The trial began on 10 May 1995 of two men for possession of 363 g (12.8 ounces) of weapons-grade plutonium-239.

August -- Unconfirmed press report says 3 kg of enriched uranium were seized in August in southwestern Romania.

July -- Press reporting dated 19 July indicates Turkish National Police arrested seven Turks and seized 12 kg of weapons-grade uranium.

July -- According to 6 July press reporting, Russian authorities in Shezninks discover 5.5 kg of U-238 previously stolen from the Chelyabinsk-65 nuclear facility.

July -- According to a 2 November press report, police in Timisoara, Romania, arrested five Romanians trying to sell 2.6 kg of Russian uranium.

13 June -- Press reporting indicates a seizure of 0.8 g of uranium 235 (enriched to 88%) occurred in Landshut, Germany.

June -- According to 6 June press reporting, Russian security official announces the arrest of three Russians in St. Petersburg who allegedly tried to sell 3.5 kg of HEU.

June -- According to an 8 July press report, Russian authorities arrested three officers from the Northern Fleet accused of having stolen 4.5 kg of U-238 from their base in Nov 93.

June -- According to a 2 November press report, police in Pitesti, Romania, arrested three Romanians trying to sell 3 kg of uranium tablets.

May -- According to 30 July press reporting, 56 g of material, including 6 g of plutonium 239, were seized and Adolf Jaekle, a German citizen, was arrested in Germany in May.

---- 1993 ----

November 1993 -- In a case stemming from an incident in November 1993 in which a Russian naval officer stole 4 kg of 20 percent enriched U-235 nuclear fuel rods from a poorly guarded area at Severomorsk, a Russian court found the officer guilty but gave him a suspended sentence because he admitted the act.

Two accomplices were sentenced to three years at a labor camp.

APPENDIX B: SUCCESSOR STATE SITES WITH WEAPONS-USABLE FISSILE MATERIAL

The first requirement in the framework to establish a fissile material supply is to seek-out and identify the locations with a legal supply of fissile material (FM) which is guarded by, or may be accessed by, persons who may potentially succumb to various incentives. The Carnegie Endowment for International Peace, Washington, DC, in cooperation with the Monterey Institute of International Studies, Monterey, Ca. provides a very detailed tabular listing of such sites, gathered from open-source information, in their publication Nuclear Successor States of the Soviet Union: Status Report on Nuclear Weapons, Fissile Material, and Export Controls. A simplified version of the information in these tables is presented[303] by country, simply to illustrate the fact that there are numerous potential sites available to would-be smugglers in the four countries that make up the nuclear successor states of the Former Soviet Union.

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[303] The information for these modified tables was taken from Nuclear Successor States of the Soviet Union: Status Report on Nuclear Weapons, Fissile Material, and Export Controls, No. 5/March 1998, published by the Carnegie Endowment for International Peace, Washington, DC, in cooperation with the Monterey Institute of International Studies, Monterey, Ca. Additional information was gathered from The Nuclear Black Market Global Organized Crime Project, by the Center for Strategic and International Studies, The PBS Website for the WGBH program FRONTLINE at http://www.pbs.org, The books Avoiding Nuclear Anarchy: Containing the Threat of Loose Russian Nuclear Weapons and Fissile Material, by Graham T. Allison, Owen R. Cote, Jr., Richard A Falkenrath and Steven E Miller, and the 1998 Strategic Assessment: Engaging Power for Peace, by the Institute for National Strategic Studies, National Defense University.

BELARUS

Site: Institute for Power Engineering Problems (IPEP) Sosny Science and Technology Center Sosny		
Plutonium • Approx. 14 kg	HEU • Approx. 40 kg enriched to 90% minimum • Approx. 330 kg enriched to between 20% -89%	IAEA SAFEGUARD VERIFICATION STATUS • Safeguarded • Inventory still incomplete
Note The IAEA is not an enforcement arm but rather an inspection organization, consequently, "The IAEA's verification system cannot physically prevent diversion of nuclear materials or the setting up of an undeclared or clandestine nuclear weapons programme".[304]		

KAZAKHSTAN

SITE: Institute of Atomic Energy-Almaty branch, National Nuclear Center (NNC) Alatau		
Plutonium • None	HEU • 15 kg enriched to 36% • Unk. kg enriched to 90%	IAEA SAFEGUARD VERIFICATION STATUS • Safeguarded • Inventory completed

[304] International Atomic Energy Agency, "Can the IAEA Prevent the Diversion of Declared Material?"

website, http://www.iaea.or.at/worldatom/inforesource/other/safeguards2/part6.html

Site: Institute of Atomic Energy-Kurchatov branch, National Nuclear Center (NNC) Kurchatov City (formerly known as Semipalatinsk-21)		
Plutonium • None	HEU • 30+kg. enriched to 90% • Some Russian-owned highly irradiated HEU	IAEA SAFEGUARD VERIFICATION STATUS • Kazak HEU safeguarded • Russian HEU not safeguarded • Inventory still in progress
Note 205 kg of Russian HEU remained in Kazakstan after the fall of the FSU. Since Russia is not subject to IAEA inspection this material is considered at risk. Some of the material was transferred back to Russia in 1996, but the highly irradiated HEU still remains.		

Site: Mangyshlyak Atomic Energy Complex Aktau (formerly known as Shevchenko)		
Plutonium • 3 metric tons	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Safeguarded • Inventory incomplete
Note A Sodium-cooled Breeder reactor located at this site can produce more than 110 kg of plutonium annually.		

Site: Ulba Metallurgy Plant Ust-Kamenogorsk		
Plutonium • No	HEU • No	IAEA SAFEGUARD VERIFICATION STATUS • Safeguarded • Inventory completed
Note This site was receiving visits from Iranian groups seeking to purchase the 600 kg of weapons-grade HEU. The United States purchased the HEU and airlifted it to Tennessee during "PROJECT SAPPHIRE" in 1994		

RUSSIA

Site: Arzamas-16, All-Russian Scientific Research Institute of Experimental Physics (VNIIEF) Sarov (formerly known as Arzamas-16)		
Plutonium • "Large quantities"	HEU • "More than a ton of weapons-usable nuclear material"	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded
Note "Russia has established special security forces to "ensure physical protection of nuclear facilities at Arzamas-16, Chelyabinsk-70(Snezhinsk), and Zlatoust-36(Trekhgornyy)"		

Site: Arzamas-16, Avangard Electromechanical Plant Sarov (formerly known as Kremlev)		
Plutonium • Yes	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded
Note This is a nuclear weapon dismantelment site. The fissile material, of which there is more than a ton, is stored here before being shipped to final destinations at Chelyabinsk-65 and Tomsk-7.		

Site: Baltiyskiy Zavod Near St. Petersburg		
Plutonium	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded
Note This is a nuclear ship-building site and new nuclear fuel is kept in storage here prior to being loaded into the reactors of the new ships.		

Site: Beloyarsk Nuclear Power Plant (NPP) Zarechniy		
Plutonium • Yes	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded
Note This site has a BN-600 fast breeder reactor		

Site: A.A. Bochvar All-Russian Scientific Research Institute for Inorganic Materials (VNIINM) Moscow		
Plutonium • Yes	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded
Note "VNIINM is involved in the development of MOX fuel fabrication technology and conducts research on spent fuel reprocessing and waste treatment technology"		

Site: Chelyabinsk-65 (formerly know as Chelyabinsk-40) Mayak Production Association Ozersk (formerly known as Chelyabinsk-65)		
Plutonium • 25-30 tons of Reactor-grade • Unk. amount of dismantled weapons plutonium	HEU • Unk. amount of dismantled weapons HEU	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded
Note "Chelyabinsk-65 has been selected as the principle site for long-term (up to 100 years) storage of nuclear material from dismantled Russian warheads"		

Site:Chelyabinsk-70 All-Russian Scientific Research Institute of Technical Physics (VNIITF) Snezhinsk (formerly Chelyabinsk-70)		
Plutonium • Yes	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded
Note This site was responsible for weapons design. There is still over a ton of weapons material located on-site.		

Site: Dimitrovgrad Scientific Research Institute for Atomic Reactors (NIIAR) Dimitrovgrad, Ulyanovsk region		
Plutonium • Yes	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded
Note "There is more than a ton of weapons-usable material at this site"		

Site: Dubna Joint Institute of Nuclear Research (JINR) Dubna		
Plutonium • @100kg of Plutonium	HEU • No	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded

Site: Elektrostal Machine Building Plant Elektrostal, near Moscow		
Plutonium • No	HEU • Some 90% HEU • Large amounts of 26% HEU	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded
Note "Overall, more than a ton of weapons-usable material"		

Site: Institute of Physics and Power Engineering Obninsk		
Plutonium • Approx. 1000 kg	HEU • 7 Tons	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded

Site: Karpov Institute of Physical Chemistry Obninsk		
Plutonium • No	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded
Note "Substantial amounts" of HEU are located at this facility		

Site: Khlopin Radium Institute St. Petersburg		
Plutonium • Yes	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded
Note This site is working on the potential use of fissile material from dismantled weapons in civilian power reactors		

Site: Krasnoyarsk-26 Mining and Chemical Combine Zheleznogorsk (formerly known as Krasnoyarsk-26)		
Plutonium • Yes	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded
Note This site was used to produce plutonium. Today it contains "tons" of Plutonium and produces 1.5 additional tons a year "Over its lifetime, (this site) has produced more that 45 tons of weapons-grade plutonium"		

Site: Krasnoyarsk-45 Electrochemical Plant Zelenogorsk (formerly known as Krasnoyarsk-45)		
Plutonium • No	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded
Note This site us used for temporary storage of dismantled nuclear warheads and has been called "the second largest uranium site in Russia"		

Site: Krylov Central Scientific Research Institute St. Petersburg		
Plutonium • No	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded
Note This site designs naval reactors		

Site: Kurchatov Institute Moscow		
Plutonium • Yes	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded
Note "Hundreds of kilograms, if not more" of HEU are stored at this site.		

Site: Luch Scientific Production Association Podolsk		
Plutonium • Unknown	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded
Note "More than a ton" of HEU is stored at this site.		

Site: Lytkarino Research Institute for Instruments Lytkarino		
Plutonium • Possible	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded
Note "Hundreds of kilograms" of HEU are located at this site		

Site: Moscow Engineering Physics Institute (MEPhl) Moscow		
Plutonium • No	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded
Note Small quantities, in the kilogram level, enriched to various levels, including 90%, are stored at this site		

Site: Moscow Institute of Theoretical and Experimental Physics Moscow		
Plutonium • Unknown	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded

Site: Novosibirsk Chemical Concentrates Plant Novosibirsk-38		
Plutonium • No	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded
Note There is "more than a ton" of weapons-usable HEU located at this site		

Site: Penza-19 Start Production Association Zarechniy (formerly known as Penza-19)		
Plutonium • Yes	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded

Site: Scientific Research and Design Institute of Power Technology (NIKIET), Moscow branch Moscow		
Plutonium • Unknown	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded

Site: Scientific Research and Design Institute of Power and Technology (NIKIET), Svedlovsk branch Yekaterinburg		
Plutonium • Unknown	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded
Note HEU at this site is enriched to 90%.		

Site: St. Petersburg Nuclear Physics Institute (formerly Lenin Institute of Physics) St. Petersburg		
Plutonium • Unknown	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded
Note HEU at this site is enriched to 90%.		

Site: Sverdlovsk-44 Urals Electrochemical Integrated Plant Novouralsk (formerly Sverdlovsk-44)		
Plutonium • No	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded
Note "More than a ton" of HEU is stored at this, the largest enrichment site in Russia.		

Site: Sverdlovsk-45 Elektrokhimpribor Combine Lesnoy (formerly Sverdlovsk-45)		
Plutonium • Yes	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded
Note This site "is a nuclear warhead assembly, dismantelment and storage site. It has been referred to as one of Russia's larger weapons dismantelment sites" 1500 warheads are dismantled at this site each year		

Site: Tomsk-7 Siberian Chemical Combine Seversk (formerly known as Tomsk-7)		
Plutonium • Yes	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded
Note This site, one of the two primary storage sites for fissile material in Russia, stores "many tens of tons" of Plutonium and "many tens of tons" of HEU.		

Site: Tomsk Polytechnical University Tomsk		
Plutonium • Unknown	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded
Note Kilogram quantities are now maintained at this site "One kg of fresh 90% enriched HEU was discovered missing from this site in mid-1995, and may have been illegally diverted in late 1994 or early 1995"		

Site: Zlatoust-36 Instrument Making Plant Trekhgormyy (formerly Zlatoust-36)		
Plutonium • Yes	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded
Note This site is "a nuclear warhead assembly, dismantelment, and storage facility" There is "more than two tons of weapons-usable material" located at this site.		

Site: Northern Fleet Naval Bases and Shipyards; Nuclear Powered Civilian Vessels Shipyard Murmansk		
Plutonium • No	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded

Site: Pacific Fleet Kamchatka Peninsula and Primorskiy Kray		
Plutonium • No	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Unsafeguarded
Note The various shipyards and bases in the Russian Pacific Fleet, such as Shipyard No. 199 north of Khabarovsk, Gomyak shipyard in Krashennikova Bay and Shkotovo-22 at Chazma Bay also maintain large stocks of both fresh and spent reactor fuel and waste similar to the Northern Fleet.		

UKRAINE

Site: Institute of Nuclear Research of the National Academy of Sciences Kiev		
Plutonium • Yes	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Safeguarded
Note This site maintains small quantities of Plutonium. The HEU on site is used for research in the site's reactor and has been enriched to 90% and 36%		

Site: National Science Center: Kharkiv Physics and Technology Institute (KhPTI) Kharkiv		
Plutonium • No	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Safeguarded
Note This site has up to 75 kg of 90% enriched uranium as well as storage facilities for nuclear material		

Site: Sevastopol Institute of Nuclear Energy and Industry Sevastopol		
Plutonium • No	HEU • Yes	IAEA SAFEGUARD VERIFICATION STATUS • Safeguarded
Note This site maintains 3-6 kg of HEU enriched to 36% and will be used as a training site for future reactor operators		

APPENDIX C: KNOWN TERRORIST ORGANIZATIONS

The following is an alphabetical listing of known terrorist organizations reprinted here from the United States State Department publication titled "Patterns of Global Terrorism: 1997", U.S. State Department publication number 10535. The publication is also available online at:

www.state.gov/www/global/terrorism/1997report/1997index.html

BACKGROUND INFORMATION ON TERRORIST GROUPS

The following list of terrorist groups is not exhaustive. It focuses on the groups that were designated foreign terrorist organizations on 8 October 1997 pursuant to the Antiterrorism and Effective Death Penalty Act of 1996 (denoted by an asterisk) but also includes other major groups that were active in 1997. Terrorist groups whose activities were limited in scope in 1997 are not included.

Abu Nidal organization (ANO)* a.k.a. Fatah Revolutionary Council, Arab Revolutionary Council, Arab Revolutionary Brigades, Black September, and Revolutionary Organization of Socialist Muslims

Description
International terrorist organization led by Sabri al-Banna. Split from PLO in 1974. Made up of various functional committees, including political, military, and financial.

Activities
Has carried out terrorist attacks in 20 countries, killing or injuring almost 900 persons. Targets include the United States, the United Kingdom, France, Israel, moderate Palestinians, the PLO, and various Arab countries. Major attacks included the Rome and Vienna airports in December 1985, the Neve Shalom synagogue in Istanbul, the Pan Am Flight 73 hijacking in Karachi in September 1986, and the City of Poros day-excursion ship attack in July 1988 in Greece. Suspected of assassinating PLO deputy chief Abu Iyad and PLO security chief Abu Hul in Tunis in January 1991. ANO assassinated a Jordanian diplomat in Lebanon in January 1994 and has been linked to the killing of the PLO representative there. Has not attacked Western targets since the late 1980s.

Strength
Several hundred plus militia in Lebanon and limited overseas support structure.

Location/Area of Operation
Currently headquartered in Libya with an operational presence in Lebanon in the Al Biqa' (Bekaa Valley) and also several Palestinian refugee camps in coastal areas of Lebanon.

Also has a presence in Sudan, Syria, and Iraq, among others. Has demonstrated ability to operate over wide area, including the Middle East, Asia, and Europe.

External Aid
Has received considerable support, including safehaven, training, logistic assistance, and financial aid from Iraq and Syria (until 1987); probably continues to receive aid from Libya, in addition to close support for selected operations.

Abu Sayyaf Group (ASG)*

Description
Islamic extremist group operating in the southern Philippines led by Abdurajik Abubakar Janjalani. Split from the Moro National Liberation Front in 1991.

Activities
Uses bombs, assassinations, kidnappings for ransom, and extortion payments from companies and businessmen in its efforts to promote an Iranian-style Islamic state in Mindanao, an island in the southern Philippines heavily populated by Muslims. Staged a raid on the town of Ipil in Mindanao in April 1995, the group's first large-scale action. The group is suspected in several assassinations in 1997, including that of a Catholic bishop in February.

Strength
Unknown, but believed to be about 200 members, mostly younger Muslims, many of whom have studied or worked in the Gulf states, where they were exposed to radical Islamic ideology.

Location/Area of Operation
The ASG operates in the southern Philippines and occasionally in Manila.

External Aid
Probably has ties to Islamic extremists in the Middle East.

Al-Jihad (see under J)

Alex Boncayao Brigade (ABB)

Description
The ABB, the urban hit squad of the Communist Party of the Philippines, was formed in the mid-1980s.

Activities
The ABB is responsible for more than 100 murders and is believed to have been involved in the 1989 murder of US Army Col. James Rowe in the Philippines. Although reportedly decimated by a series of arrests in late 1995, the June 1996 murder of a former high-ranking Philippine official, claimed by the group, demonstrates that it still maintains

terrorist capabilities. In March 1997, the group announced that it had formed an alliance with another armed group, the Revolutionary Proletarian Army.

Strength
Approximately 500.

Location/Area of Operation
Operates exclusively in Manila.

External Aid
Unknown.

Armed Islamic Group (GIA)*

Description
An Islamic extremist group, the GIA aims to overthrow the secular Algerian regime and replace it with an Islamic state. The GIA began its violent activities in early 1992 after Algiers voided the victory of the Islamic Salvation Front (FIS)--the largest Islamic party--in the first round of December 1991 legislative elections.

Activities
Frequent attacks against civilians, journalists, and foreign residents. In the last year, the GIA has embarked on a terrorist campaign of civilian massacres, sometimes wiping out entire villages in its area of operations and frequently killing hundreds of civilians. Since announcing its terrorist campaign against foreigners living in Algeria in September 1993, the GIA has killed more than 100 expatriate men and women--mostly Europeans--in the country. The GIA uses assassinations and bombings, including car bombs, and it is known to favor kidnapping victims and slitting their throats. The GIA hijacked an Air France flight to Algiers in December 1994, and suspicions centered on the group for a series of bombings in France in 1995.

Strength
Unknown, probably several hundred to several thousand.

Location/Area of Operation
Algeria.

External Aid
Algerian expatriates and GIA members abroad, many of whom reside in Western Europe, provide some financial and logistic support. In addition, the Algerian Government has accused Iran and Sudan of supporting Algerian extremists and severed diplomatic relations with Iran in March 1993.

Aum Supreme Truth (Aum)* a.k.a. Aum Shinrikyo

Description

A cult established in 1987 by Shoko Asahara, Aum aims to take over Japan and then the world; its organizational structure mimics that of a nation-state, with "ministries" and a "pope secretariat." Followers are controlled by a mix of charismaticism and coercion. Approved as a religious entity in 1989 under Japanese law, the group was active in local Japanese elections in 1990. Disbanded as a religious organization under Japanese law in October 1995, but in 1997 a government panel decided not to invoke the Anti-Subversive Law against the cult, which would have outlawed the sect.

Activities
On 20 March 1995 Aum members carried six packages onto Tokyo subway trains and punctured the packages with umbrella tips, releasing deadly sarin gas that killed 12 persons and injured more than 5,000. Japanese police arrested Asahara in May 1995, and he was on trial as 1997 ended. Several key Aum figures remain at large. The group may have perpetrated other crimes before the March 1995 attack and apparently planned future attacks.

Strength
At the time of the Tokyo subway attack, the group claimed to have 9,000 members in Japan and up to 40,000 worldwide. Its current strength is unknown.

Location/Area of Operation
Operates in Japan, but previously had a presence in Australia, Russia, Ukraine, Germany, Taiwan, Sri Lanka, the former Yugoslavia, and the United States.

External Aid
None.

Basque Fatherland and Liberty (ETA)* a.k.a. Euzkadi Ta Askatasuna

Description
Founded in 1959 with the aim of creating an independent homeland in Spain's Basque region. Has muted commitment to Marxism.

Activities
Chiefly bombings and assassinations of Spanish Government officials, especially security and military forces, politicians, and judicial figures. In response to French operations against the group, ETA also has targeted French interests. Finances its activities through kidnappings, robberies, and extortion. ETA has killed over 800 persons since it began lethal attacks in the early 1960s; responsible for murdering 13 persons in 1997.

Strength
Unknown; may have hundreds of members, plus supporters.

Location/Area of Operation
Operates primarily in the Basque autonomous regions of northern Spain and southwestern France, but also has bombed Spanish and French interests elsewhere.

External Aid
Has received training at various times in the past in Libya, Lebanon, and Nicaragua. Some ETA members allegedly have received sanctuary in Cuba. Also appears to have ties to the Irish Republican Army through the two groups' legal political wings.

Democratic Front for the Liberation of Palestine (DFLP)*

Description
Marxist-Leninist organization founded in 1969 when it split from the Popular Front for the Liberation of Palestine (PFLP). Believes Palestinian national goals can be achieved only through revolution of the masses. In early 1980s, occupied political stance midway between Arafat and the rejectionists. Spilt into two factions in 1991; Nayif Hawatmah leads the majority and more hard-line faction, which continues to dominate the group. Joined with other rejectionist groups to form the Alliance of Palestinian Forces (APF) to oppose the Declaration of Principals signed in 1993. Broke from the APF--along with the PFLP--over ideological differences. Has made limited moves toward merging with the PFLP since the mid-1990s.

Activities
In the 1970s carried out numerous small bombings and minor assaults and some more spectacular operations in Israel and the occupied territories, concentrating on Israeli targets. Involved only in border raids since 1988, but continues to oppose the Israel-PLO peace agreement.

Strength
Estimated at 500 (total for both factions).

Location/Area of Operation
Syria, Lebanon, and the Israeli-occupied territories; terrorist attacks have taken place entirely in Israel and the occupied territories. Conducts occasional guerrilla operations in southern Lebanon.

External Aid
Receives limited financial and military aid from Syria.

Devrimci Sol (Revolutionary Left) a.k.a. Dev Sol (see Revolutionary People's Liberation Party/Front, DHKP/C)

ELA (see Revolutionary People's Struggle)

ELN (see National Liberation Army)

ETA (see Basque Fatherland and Liberty)

FARC (see Revolutionary Armed Forces of Colombia)

FPMR (see Manuel Rodriguez Patriotic Front)

al-Gama'at al-Islamiyya (Islamic Group, IG)*

Description
An indigenous Egyptian Islamic extremist group active since the late 1970s; appears to be loosely organized with no single readily identifiable operational leader. Shaykh Umar Abd al-Rahman is the group's preeminent spiritual leader. Goal is to overthrow the government of President Hosni Mubarak and replace it with an Islamic state.

Activities
Armed attacks against Egyptian security and other government officials, Coptic Christians, and Egyptian opponents of Islamic extremism. The group also has launched attacks on tourists in Egypt since 1992. Al-Gama'at claimed responsibility for the attempt in June 1995 to assassinate President Hosni Mubarak in Addis Ababa, Ethiopia.

Strength
Unknown, but probably several thousand hard-core members and another several thousand sympathizers.

Location/Area of Operation
Operates mainly in the Al Minya, Asyu't, Qina, and Soha Governorates of southern Egypt. It also appears to have support in Cairo, Alexandria, and other urban locations, particularly among unemployed graduates and students.

External Aid
Unknown. Egyptian Government believes that Iran, Sudan, and Afghan militant Islamic groups support the group.

HAMAS (Islamic Resistance Movement)*

Description
HAMAS was formed in late 1987 as an outgrowth of the Palestinian branch of the Muslim Brotherhood. Various elements of HAMAS have used both political and violent means, including terrorism, to pursue the goal of establishing an Islamic Palestinian state in place of Israel. HAMAS is loosely structured, with some elements working openly through mosques and social service institutions to recruit members, raise money, organize activities, and distribute propaganda. Militant elements of HAMAS, operating clandestinely, have advocated and used violence to advance their goals. HAMAS's strength is concentrated in the Gaza Strip and in a few areas of the West Bank. It also has engaged in peaceful political activity, such as running candidates in West Bank Chamber of Commerce elections.

Activities

HAMAS activists, especially those in the Izz el-Din al-Qassam Brigades, have conducted many attacks--including large-scale suicide bombings--against Israeli civilian and military targets, suspected Palestinian collaborators, and Fatah rivals.

Strength
Unknown number of hardcore members; tens of thousands of supporters and sympathizers.

Location/Area of Operation
Primarily the occupied territories, Israel, and Jordan.

External Aid
Receives funding from Palestinian expatriates, Iran, and private benefactors in Saudi Arabia and other moderate Arab states. Some fundraising and propaganda activities take place in Western Europe and North America.

The Harakat ul-Ansar (HUA)*

Description
The Harakat ul-Ansar (HUA), an Islamic militant group based in Pakistan and operating primarily in Kashmir, was formed in October 1993 when two political activist groups--Harakat ul-Jihad al-Islami and Harakat ul-Mujahedin--merged.

Activities
Has carried out a number of operations against Indian troops and civilian targets in Kashmir. It has been linked to the Kashmiri militant group Al-Faran that kidnapped five Western tourists in Kashmir in July 1995; one was killed in August 1995, and the other four reportedly were killed in December of the same year.

Strength
The HUA has several thousand armed supporters located in Azad Kashmir, Pakistan, and in the southern Kashmir and the Doda regions of India composed of mostly Pakistanis and Kashmiris, but including Afghans and Arab veterans of the Afghan war. The HUA uses light and heavy machineguns, assault rifles, mortars, explosives, and rockets.

Location/Area of Operation
The HUA is based in Muzaffarabad, Pakistan, but HUA members conduct insurgent and terrorist activities primarily in Kashmir. The HUA trains its militants in Afghanistan and Pakistan.

External Aid
The HUA collects donations from sympathizers in Saudi Arabia and other Gulf and Islamic states and from Pakistanis and Kashmiris. The source and amount of HUA's military funding are unknown.

Hizballah (Party of God)* a.k.a. Islamic Jihad, Revolutionary Justice Organization, Organization of the Oppressed on Earth, and Islamic Jihad for the Liberation of Palestine

Description
Radical Shia group formed in Lebanon; dedicated to creation of Iranian-style Islamic republic in Lebanon and removal of all non-Islamic influences from area. Strongly anti-Western and anti-Israeli. Closely allied with, and often directed by Iran, but may have conducted operations that were not approved by Tehran.

Activities
Known or suspected to have been involved in numerous anti-US terrorist attacks, including the suicide truck bombing of the US Embassy and US Marine barracks in Beirut in October 1983 and the US Embassy Annex in Beirut in September 1984. Elements of the group were responsible for the kidnapping and detention of US and other Western hostages in Lebanon. The group also attacked the Israeli Embassy in Argentina in 1992.

Strength
Several thousand.

Location/Area of Operation
Operates in the Al Biqa' (Bekaa Valley), the southern suburbs of Beirut, and southern Lebanon. Has established cells in Europe, Africa, South America, North America, and elsewhere.

External Aid
Receives substantial amounts of financial, training, weapons, explosives, political, diplomatic, and organizational aid from Iran and Syria.

Irish Republican Army (IRA) a.k.a Provisional Irish Republican Army (PIRA), the Provos

Description
Radical terrorist group formed in 1969 as clandestine armed wing of Sinn Fein, a legal political movement dedicated to removing British forces from Northern Ireland and unifying Ireland. Has a Marxist orientation. Organized into small, tightly knit cells under the leadership of the Army Council.

Activities
Bombings, assassinations, kidnappings, extortion, and robberies. Before its 1994 cease-fire, targets included senior British Government officials, British military and police in Northern Ireland, and Northern Irish Loyalist paramilitary groups. Since breaking its cease-fire in February 1996, IRA's operations have included bombing campaigns against train and subway stations and shopping areas on mainland Britain, British military and Royal Ulster Constabulary targets in Northern Ireland, and a British military facility on the European Continent.

Strength
Several hundred, plus several thousand sympathizers.

Location/Area of Operation
Northern Ireland, Irish Republic, Great Britain, and Europe.

External Aid
Has received aid from a variety of groups and countries and considerable training and arms from Libya and, at one time, the PLO. Also is suspected of receiving funds and arms from sympathizers in the United States. Similarities in operations suggest links to the ETA.

Islamic Resistance Movement (see HAMAS)

Jamaat ul-Fuqra

Description
Jamaat ul-Fuqra is an Islamic sect that seeks to purify Islam through violence. Fuqra is led by Pakistani cleric Shaykh Mubarik Ali Gilani, who established the organization in the early 1980s. Gilani now resides in Pakistan, but most Fuqra cells are located in North America and the Caribbean. Fuqra members have purchased isolated rural compounds in North America to live communally, practice their faith, and insulate themselves from Western culture.

Activities
Fuqra members have attacked a variety of targets that they view as enemies of Islam, including Muslims they regard as heretics and Hindus. Attacks during the 1980s included assassinations and firebombings across the United States. Fuqra members in the United States have been convicted of criminal violations, including murder and fraud.

Strength
Unknown.

Location/Area of Operation
North America, Pakistan.

External Aid
None.

Japanese Red Army (JRA)* a.k.a. Anti-Imperialist International Brigade (AIIB)

Description
An international terrorist group formed around 1970 after breaking away from Japanese Communist League-Red Army Faction. Led by Fusako Shigenobu, believed to be in hiding outside Japan. Stated goals are to overthrow Japanese Government and monarchy

and to help foment world revolution. Organization unclear but may control or at least have ties to Anti-Imperialist International Brigade (AIIB). Details released following arrest in November 1987 of leader Osamu Maruoka indicate that JRA may have been organizing cells in Asian cities, such as Manila and Singapore. Has had close and longstanding relations with Palestinian terrorist groups--based and operating outside Japan--since its inception.

Activities
During the 1970s, JRA carried out a series of attacks around the world, including the massacre in 1972 at Lod Airport in Israel, two Japanese airliner hijackings, and an attempted takeover of the US Embassy in Kuala Lumpur. In April 1988, JRA operative Yu Kikumura was arrested with explosives on the New Jersey Turnpike, apparently planning an attack to coincide with the bombing of a USO club in Naples, a suspected JRA operation that killed five, including a US servicewoman. Kikumura was convicted of these charges and is serving a lengthy prison sentence in the United States. In March 1995, Ekita Yukiko, a longtime JRA activist, was arrested in Romania and subsequently deported to Japan.

Strength
About seven hardcore members; undetermined number of sympathizers.

Location/Area of Operation
Formerly based in Syrian-controlled areas of Lebanon; current location of members and cells unknown.

External Aid
Unknown.

al-Jihad* a.k.a. Jihad Group, Islamic Jihad, New Jihad Group, Vanguards of Conquest, Talaa' al-Fateh

Description
An Egyptian Islamic extremist group active since the late 1970s; appears to be divided into at least two separate factions: remnants of the original Jihad led by Abbud al-Zumar, currently imprisoned in Egypt, and a faction calling itself Vanguards of Conquest (Talaa' al-Fateh or the New Jihad Group). The Vanguards of Conquest appears to be led by Dr. Ayman al-Zawahiri, who is currently outside Egypt; his specific whereabouts are unknown. Like al-Gama'at al-Islamiyya, the Jihad factions regard Sheikh Umar Abd-al Rahman as their spiritual leader. The goal of all Jihad factions is to overthrow the government of President Hosni Mubarak and replace it with an Islamic state.

Activities
Specializes in armed attacks against high-level Egyptian Government officials. The original Jihad was responsible for the assassination in 1981 of President Anwar Sadat. Unlike al-Gama'at al-Islamiyya, which mainly targets mid- and lower-level security personnel, Coptic Christians, and Western tourists, al-Jihad appears to concentrate

primarily on high-level, high-profile Egyptian Government officials, including cabinet ministers. Claimed responsibility for the attempted assassinations of Interior Minister Hassan Al-Alfi in August 1993 and Prime Minister Atef Sedky in November 1993.

Strength
Not known, but probably several thousand hardcore members and another several thousand sympathizers among the various factions.

Location/Area of Operation
Operates mainly in the Cairo area. Also appears to have members outside Egypt, probably in Afghanistan, Pakistan, and Sudan.

External Aid
Not known. The Egyptian Government claims that Iran, Sudan, and militant Islamic groups in Afghanistan support the Jihad factions.

Kach* and Kahane Chai*

Description
Stated goal is to restore the biblical state of Israel. Kach (founded by radical Israeli-American Rabbi Meir Kahane) and its offshoot Kahane Chai, which means "Kahane Lives" (founded by Meir Kahane's son Binyamin following his father's assassination in the United States), were declared to be terrorist organizations in March 1994 by the Israeli Cabinet under the 1948 Terrorism Law. This followed the groups' statements in support of Dr. Baruch Goldstein's attack in February 1994 on the al-Ibrahimi Mosque--Goldstein was affiliated with Kach--and their verbal attacks on the Israeli Government.

Activities
Organize protests against the Israeli Government. Harass and threaten Palestinians in Hebron and the West Bank. Groups have threatened to attack Arabs, Palestinians, and Israeli Government officials. They also claimed responsibility for several shooting attacks on West Bank Palestinians in which four persons were killed and two were wounded in 1993.

Strength
Unknown.

Location/Area of Operation
Israel and West Bank settlements, particularly Qiryat Arba' in Hebron.

External Aid
Receives support from sympathizers in the United States and Europe.

Khmer Rouge (see The Party of Democratic Kampuchea)

Kurdistan Workers' Party (PKK)*

Description
Established in 1974 as a Marxist-Leninist insurgent group primarily composed of Turkish Kurds. In recent years has moved beyond rural-based insurgent activities to include urban terrorism. Seeks to set up an independent Kurdish state in southeastern Turkey, where there is a predominantly Kurdish population.

Activities
Primary targets are Turkish Government security forces in Turkey but also has been active in Western Europe against Turkish targets. Conducted attacks on Turkish diplomatic and commercial facilities in dozens of West European cities in 1993 and again in spring 1995. In an attempt to damage Turkey's tourist industry, the PKK has bombed tourist sites and hotels and kidnapped foreign tourists.

Strength
Approximately 10,000 to 15,000 guerrillas. Has thousands of sympathizers in Turkey and Europe.

Location/Area of Operation
Operates in Turkey, Europe, the Middle East, and Asia.

External Aid
Receives safehaven and modest aid from Syria, Iraq, and Iran.

The Liberation Tigers of Tamil Eelam (LTTE)* Other known front organizations: World Tamil Association (WTA), World Tamil Movement (WTM), the Federation of Associations of Canadian Tamils (FACT), the Ellalan Force

Description
Founded in 1976, the LTTE is the most powerful Tamil group in Sri Lanka and uses overt and illegal methods to raise funds, acquire weapons, and publicize its cause of establishing an independent Tamil state. The LTTE began its armed conflict with the Sri Lankan Government in 1983 and relies on a guerrilla strategy that includes the use of terrorist tactics. The group's elite Black Tiger squad conducts suicide bombings against important targets, and all rank-and-file members carry a cyanide capsule to kill themselves rather than allow themselves to be caught. The LTTE is very insular and highly organized with its own intelligence service, naval element (the Sea Tigers), and women's political and military wings.

Activities
The LTTE has integrated a battlefield insurgent strategy with a terrorist program that targets key government and military personnel, the economy, and public infrastructure. Political assassinations include the suicide bomber attacks against Sri Lankan President Ranasinghe Premadasa in 1993 and Indian Prime Minister Rajiv Gandhi in 1991, which is the group's only known act outside Sri Lanka. The LTTE has detonated two massive truck bombs directed against the Sri Lankan economy, one at the Central Bank in January

1996 and another at the Colombo World Trade Center in October 1997. The LTTE also has attacked several ships in Sri Lankan waters, including foreign commercial vessels and infrastructure targets such as commuter trains, buses, oil tanks, and power stations. The LTTE prefers to attack vulnerable government facilities then withdraw before reinforcements arrive, or to time its attacks to take advantage of security lapses on holidays, at night, or in the early morning.

Strength
Approximately 10,000 armed combatants in Sri Lanka; about 3,000 to 6,000 form a trained cadre of fighters. The LTTE also has a significant overseas support structure for fundraising, weapons procurement, and propaganda activities.

Location/Area of Operation
The Tigers control most of the northern and eastern coastal areas of Sri Lanka but have conducted operations throughout the island. Headquartered in the Wanni region, LTTE leader Velupillai Prabhakaran has established an extensive network of checkpoints and informants to keep track of any outsiders who enter the group's area of control.

External Aid
The LTTE's overt organizations support Tamil separatism by lobbying foreign governments and the United Nations. The LTTE also uses its international contacts to procure weapons, communications, and bombmaking equipment. The LTTE exploits large Tamil communities in North America, Europe, and Asia to obtain funds and supplies for its fighters in Sri Lanka. Information obtained since the mid-1980s indicates that some Tamil communities in Europe are also involved in narcotics smuggling.

Loyalist Volunteer Force (LVF)

Description
Extremist terrorist group formed in 1996 as a splinter of the mainstream Loyalist Ulster Volunteer Force (UVF). Seeks to subvert a political settlement with Irish nationalists in Northern Ireland by attacking Catholic politicians, civilians, and Protestant politicians who endorse the Northern Ireland peace process. Comprised of hardliners formerly associated with the UVF. Billy "King Rat" Wright, LVF founder and leader, was assassinated on 27 December by members of the Irish National Liberation Army (INLA), a Republican terrorist fringe group.

Activities
Bombings, kidnappings, and close-quarter shooting attacks. LVF bombs often contain Powergel commercial explosives, typical of many Loyalist groups. LVF attacks are particularly vicious: LVF terrorists killed an 18-year-old Catholic girl in July 1997 because she had a Protestant boyfriend and went on a killing spree, murdering Catholic civilians with no political or terrorist affiliations, following Billy Wright's assassination. The LVF also has carried out successful attacks against Irish targets in Irish border towns.

Strength
The British press speculates about 500 activists.

Location/Area of Operation
Northern Ireland, Ireland

External Aid
None.

Manuel Rodriguez Patriotic Front (FPMR)*
Description
Originally the FPMR was founded in 1983 as the armed wing of the Chilean Communist Party and was named for the hero of Chile's war of independence against Spain. The group splintered into two factions in the late 1980s, and one faction became a political party in 1991. The dissident wing FPMR/D is Chile's only remaining active terrorist group.

Activities
FPMR/D attacks civilians and international targets, including US businesses and Mormon churches. In 1993, FPMR/D bombed two McDonald's restaurants and attempted to bomb a Kentucky Fried Chicken restaurant. Successful government counterterrorist operations have significantly undercut the organization. Four FPMR members staged an escape from prison using a helicopter, however, in December 1996.

Strength
Now believed to have between 50 and 100 members.

Location/Area of Operation
Chile.

External Aid
None.

Mujahedin-e Khalq Organization (MEK or MKO)* a.k.a. The National Liberation Army of Iran (NLA, the militant wing of the MEK), the People's Mujahedin of Iran (PMOI), Muslim Iranian Student's Society (front organization used to garner financial support)

Description
Formed in the 1960s by the college-educated children of Iranian merchants, the MEK sought to counter what is perceived as excessive Western influence in the Shah's regime. In the 1970s, the MEK concluded that violence was the only way to bring about change in Iran. Since then, the MEK--following a philosophy that mixes Marxism and Islam--has developed into the largest and most active armed Iranian dissident group. Its history is studded with anti-Western activity and, most recently, attacks on the interests of the clerical regime in Iran and abroad.

Activities
The MEK directs a worldwide campaign against the Iranian Government that stresses propaganda and occasionally uses terrorist violence. During the 1970s, the MEK staged terrorist attacks inside Iran to destabilize and embarrass the Shah's regime; the group killed several US military personnel and civilians working on defense projects in Tehran. The group also supported the takeover in 1979 of the US Embassy in Tehran. In April 1992 the MEK carried out attacks on Iranian embassies in 13 different countries, demonstrating the group's ability to mount large-scale operations overseas.

Strength
Several thousand fighters based in Iraq with an extensive overseas support structure. Most of the fighters are organized in the MEK's National Liberation Army (NLA).

Location/Area of Operation
In the 1980s the MEK's leaders were forced by Iranian security forces to flee to France. Most resettled in Iraq by 1987. Since the mid-1980s, the MEK has not mounted terrorist operations in Iran at a level similar to its activities in the 1970s. Aside from the National Liberation Army's attacks into Iran toward the end of the Iran-Iraq war, and occasional NLA cross-border incursions since, the MEK's attacks on Iran have amounted to little more than harassment. The MEK has had more success in confronting Iranian representatives overseas through propaganda and street demonstrations.

External Aid
Beyond support from Iraq, the MEK uses front organizations to solicit contributions from expatriate Iranian communities.

MRTA (see Tupac Amaru Revolutionary Movement)

National Liberation Army (ELN)--Colombia*

Description
Rural-based, anti-US, Maoist-Marxist-Leninist guerrilla group formed in 1963. Attempted peace talks with the government ended in May 1992.

Activities
Periodically kidnaps foreign employees of large corporations and holds them for large ransom payments. Conducts frequent assaults on oil infrastructure and has inflicted major damage on pipelines. Extortion and bombings against US and other foreign businesses, especially the petroleum industry. Forces coca and opium poppy cultivators to pay protection money and attacks the government's efforts to eradicate these crops.

Strength
At least 3,000 combatants.

Location/Area of Operation

Colombia, border regions of Venezuela.

External Aid
None.

New People's Army (NPA)

Description
The guerrilla arm of the Communist Party of the Philippines (CPP), an avowedly Maoist group formed in December 1969 with the aim of overthrowing the government through protracted guerrilla warfare. Although primarily a rural-based guerrilla group, the NPA has an active urban infrastructure to carry out terrorism; uses city-based assassination squads called sparrow units. Derives most of its funding from contributions of supporters and so-called revolutionary taxes extorted from local businesses.

Activities
NPA is in disarray because of a split in the CPP, a lack of money, and successful government operations. With the US military gone from the country, NPA has engaged in urban terrorism against the police, corrupt politicians, and drug traffickers.

Strength
Estimated at several thousand.

Location/Area of Operation
Philippines, primarily Manila.

External Aid
Unknown.

The Palestine Islamic Jihad (PIJ)*

Description
The PIJ, which originated among militant Palestinians in the Gaza Strip during the 1970s, is a series of loosely affiliated factions rather than a cohesive group. The PIJ is committed to the creation of an Islamic Palestinian state and the destruction of Israel through holy war. Because of its strong support for Israel, the United States has been identified as an enemy of the PIJ. The PIJ also opposes moderate Arab governments that it believes have been tainted by Western secularism.

Activities
PIJ militants have threatened to retaliate against Israel and the United States for the murder of PIJ leader Fathi Shaqaqi in Malta in October 1995. It has carried out suicide bombing attacks against Israeli targets in the West Bank, Gaza Strip, and Israel. The PIJ has threatened to attack US interests in Jordan.

Strength

Unknown.

Location/Area of Operation
Primarily Israel and the occupied territories and other parts of the Middle East, including Jordan and Lebanon. The largest faction is based in Syria.

External Aid
Receives financial assistance from Iran and limited assistance from Syria.

Palestine Liberation Front (PLF)*

Description
Terrorist group that broke away from the PFLP-GC in mid-1970s. Later split again into pro-PLO, pro-Syrian, and pro-Libyan factions. Pro-PLO faction led by Muhammad Abbas (Abu Abbas), who became member of PLO Executive Committee in 1984 but left it in 1991.

Activities
The Abu Abbas-led faction has carried out attacks against Israel. Abbas's group was also responsible for the attack in 1985 on the cruise ship Achille Lauro and the murder of US citizen Leon Klinghoffer. A warrant for Abu Abbas's arrest is outstanding in Italy.

Strength
At least 50.

Location/Area of Operation
PLO faction based in Tunisia until Achille Lauro attack. Now based in Iraq.

External Aid
Receives support mainly from Iraq, has received support from Libya in the past.

The Party of Democratic Kampuchea (Khmer Rouge)*

Description
The Khmer Rouge is a Communist insurgency that is trying to destabilize the Cambodian Government. Under Pol Pot's leadership, the Khmer Rouge conducted a campaign of genocide in which more than 1 million persons were killed during its four years in power in the late 1970s. Although there have been large-scale defections from the Khmer Rouge to Cambodian Government forces since 1996, and the group suffered a significant split in 1997, it still may be considered dangerous.

Activities
The Khmer Rouge now is engaged in a low-level insurgency against the Cambodian Government. Although its victims are mainly Cambodian villagers, the Khmer Rouge has occasionally kidnapped and killed foreigners traveling in remote rural areas.

Strength
One to two thousand.

Location/Area of Operation
The Khmer Rouge operates in outlying provinces in Cambodia, particularly in pockets along the Thailand border.

External Aid
The Khmer Rouge is not currently receiving external assistance.

PKK (see Kurdistan Workers' Party)

Popular Front for the Liberation of Palestine (PFLP)*

Description
Marxist-Leninist group founded in 1967 by George Habash as a member of the PLO. Joined the Alliance of Palestinian Forces (APF) to oppose the Declaration of Principles signed in 1993 and has suspended participation in the PLO. Broke away from the APF, along with the DFLP, in 1996 over ideological differences. Has made limited moves toward merging with the DFLP since the mid-1990s.

Activities
Committed numerous international terrorist attacks during the 1970s. Since 1978, PFLP has carried out numerous attacks against Israeli or moderate Arab targets, including the killing of a settler and her son in December 1996.

Strength
Some 800.

Location/Area of Operation
Syria, Lebanon, Israel, and the occupied territories.

External Aid
Receives most of its financial and military assistance from Syria and Libya.

Popular Front for the Liberation of Palestine-General Command (PFLP-GC)*

Description
Split from the PFLP in 1968, claiming that it wanted to focus more on fighting and less on politics. Violently opposed to Arafat's PLO. Led by Ahmad Jibril, a former captain in the Syrian Army. Closely tied to both Syria and Iran.

Activities
Has carried out numerous cross-border terrorist attacks into Israel using unusual means, such as hot-air balloons and motorized hang gliders.

Strength
Several hundred.

Location/Area of Operation
Headquartered in Damascus, bases in Lebanon, and cells in Europe.

External Aid
Receives logistic and military support from Syria and its financial support from Iran.

Provisional Irish Republican Army (PIRA), (see Irish Republican Army)

Revolutionary Armed Forces of Colombia (FARC)*

Description
The largest, best trained, and best equipped guerrilla organization in Colombia. Established in 1966 as military wing of Colombian Communist Party. Goal is to overthrow government and ruling class. Organized along military lines; includes at least one urban front. Has been anti-US since its inception.

Activities
Armed attacks against Colombian political and military targets. Many members pursue criminal activities, carrying out kidnappings for profit and bank robberies. Foreign citizens often are targets of FARC kidnappings. Group traffics in drugs and has well-documented ties to narcotraffickers.

Strength
Approximately 7,000 armed combatants and an unknown number of supporters, mostly in rural areas.

Location/Area of Operation
Colombia, with occasional operations in Venezuela, Panama, and Ecuador.

External Aid
None.

Revolutionary Organization 17 November (17 November)*

Description
A radical leftist group established in 1975 and named for the November 1973 student uprising in Greece protesting the military regime. The group is anti-Greek establishment, anti-United States, anti-Turkey, anti-NATO; committed to the ouster of US bases, removal of Turkish military presence from Cyprus, and severing of Greece's ties to NATO and the European Union (EU). Organization is obscure, possibly affiliated with other Greek terrorist groups.

Activities

Initial attacks were assassinations of senior US officials and Greek public figures. Added bombings in 1980s. Since 1990, has expanded targets to include EU facilities and foreign firms investing in Greece and has added improvised rocket attacks to its methods.

Strength
Unknown, but presumed to be small.

Location/Area of Operation
Athens, Greece.

External Aid
Unknown.

Revolutionary People's Liberation Party/Front (DHKP/C)* a.k.a.: Devrimci Sol (Revolutionary Left), Dev Sol

Description
Originally formed in 1978 as Devrimci Sol, or Dev Sol, it was a splinter faction of the Turkish People's Liberation Party/Front. Renamed in 1994 after factional infighting, it still espouses a Marxist ideology and is virulently anti-United States and anti-NATO. The group finances its activities chiefly through armed robberies and extortion.

Activities
Since the late 1980s, has concentrated attacks against current and retired Turkish security and military officials. Began a new campaign against foreign interests in 1990. Protesting the Gulf war, it assassinated two US military contractors and wounded a US Air Force officer. Launched rockets at US Consulate in Istanbul in 1992. Assassinated prominent Turkish businessman in early 1996, which was its first significant terrorist act as DHKP/C.

Strength
Unknown.

Location/Area of Operation
Carries out attacks in Turkey, primarily in Istanbul, Ankara, Izmir, and Adana. Conducts fundraising operations in Western Europe.

External Aid
Unknown.

Revolutionary People's Struggle (ELA)*

Description
An extreme leftist group that developed out of the opposition to the military junta that ruled Greece from 1967 to 1974. Formed in 1971, the ELA is a self-described revolutionary, anti-capitalist, and anti-imperialist group, which has declared its

opposition to "imperialist domination, exploitation, and oppression." The ELA is strongly anti-United States and seeks the removal of US military forces from Greece.

Activities
Since 1974, the group has carried out bombings against Greek Government and economic targets as well as US military and business facilities. In 1986, the group stepped up attacks on Greek Government and commercial interests. In November 1990, a raid on a safehouse revealed a weapons cache and direct contacts with other Greek terrorist groups, including 1 May and Revolutionary Solidarity. During 1991, ELA and 1 May claimed joint responsibility for more than 20 bombings. Greek police believe they have established a link between the ELA and the Revolutionary Organization 17 November.

Strength
Unknown.

Location/Area of Operation
Greece.

External Aid
No known foreign sponsors.

Sendero Luminoso (Shining Path, SL)*

Description
Larger of Peru's two insurgencies, SL is among the world's most ruthless guerrilla organizations. Formed in the late 1960s by then university professor Abimael Guzman. Stated goal is to destroy existing Peruvian institutions and replace them with peasant revolutionary regime. Also wants to rid Peru of foreign influences. Guzman's capture in September 1992 was a major blow, as were arrests of other SL leaders in 1995, defections, and President Fujimori's amnesty program for repentant terrorists.

Activities
Has engaged in particularly brutal forms of terrorism, including the indiscriminate use of bombs. Almost every institution in Peru has been a target of SL violence. Has bombed diplomatic missions of several countries in Peru, including the US Embassy. Carries out bombing campaigns and selective assassinations. Has attacked US businesses since its inception. Involved in cocaine trade.

Strength
Approximately 1,500 to 2,500 armed militants; larger number of supporters, mostly in rural areas.

Location/Area of Operation
Rural based, with some terrorist attacks in the capital.

External Aid

None.

17 November (see Revolutionary Organization 17 November)

Sikh Terrorism

Description
Sikh terrorism is sponsored by expatriate and Indian Sikh groups who want to carve out an independent Sikh state called Khalistan (Land of the Pure) from Indian terroritory. Active groups include Babbar Khalsa, International Sikh Youth Federation, Dal Khalsa, Bhinderanwala Tiger Force. A previously unknown group, the Saheed Khalsa Force, claimed credit for the marketplace bombings in New Delhi in 1997.

Activities
Sikh attacks in India are mounted against Indian officials and facilities, other Sikhs, and Hindus; they include assassinations, bombings, and kidnappings. These attacks have dropped markedly since 1992, as Indian security forces have killed or captured a host of senior Sikh militant leaders and scored other successes against extremist groups. Many low-intensity bombings that might be attributable to Sikh extremists now occur without claims of credit.

Strength
Unknown.

Location/Area of Operation
Northern India, Western Europe, Southeast Asia, and North America.

External Aid
Silk militant cells are active internationally, and extremists gather funds from overseas Sikh communities. Sikh expatriates have formed a variety of international organizations that lobby for the Sikh cause overseas. Most prominent are the World Sikh Organization and the International Sikh Youth Federation.

Tupac Amaru Revolutionary Movement (MRTA)*

Description
Traditional Marxist-Leninist revolutionary movement formed in 1983. Objective remains to rid Peru of imperialism and establish Marxist regime. Has suffered from defections and government counterterrorist successes in addition to infighting and loss of leftist support.

Activities
Bombings, kidnappings, ambushes, and assassinations. Previously responsible for large number of anti-US attacks; recent activity has dropped off dramatically. Most members have been jailed. Nevertheless, in December 1996, 14 MRTA members took over the Japanese Ambassador's residence in Lima during a diplomatic reception, capturing

hundreds of hostages. Government forces stormed the residence in April, rescuing all but one of the remaining hostages.

Strength
Believed to have roughly 100 remaining members.

Location/Area of Operation
Peru.

External Aid
None.